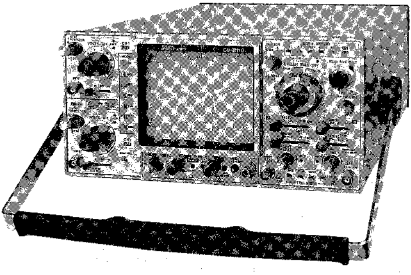
CS-2110

100MHz
QUAD-TRACE
OSCILLOSCOPE



KENWOOD

WARNING

1. The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform servicing other than contained in the operating instructions unless you are qualified to do so.

2. High voltage up to 20000 volts dc is present when the oscilloscope is operating. Line voltage (90 to 264 VAC) is present on the power supply UNIT, on-off switch, and fuse holder, any time the oscilloscope is connected to an ac power source, even if turned off. Always observe caution when the housing is removed from the unit. contacting exposed high voltage could result in fatal electric shock.

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SPECIFICATIONS

CRT

Model:	150KTM31
Type:	Rectangular, with internal graticule
Accelerating potential:	20kV
Display area:	8 div × 10 div (1 div = 1 cm)

VERTICAL AXIS (Channel 1 and Channel 2 identical specifications)

Sensitivity	5mV/div to 5V/div (X1 mode) 1 mV/div to 1V/div (X5 mode) 500µV/div (Cascaded operation, CH1 to CH2)
Accuracy:	±2% (10 ~ 35°C) ±4% (0 ~ 50°C) ±7% (Cascaded operation, CH1 to CH2)
Attenuator:	5mV/div to 5V/div in 1-2-5 sequence, all 10 ranges with fine adjustment. between steps.
Input resistance:	1 MΩ ±1%
Input capacitance:	Approx 22pF
Frequency response	
DC:	DC to 100 MHz (–3 dB) DC to 140 MHz (–6 dB) (unapplied × 5 GAIN mode) DC to 70 MHz (–3 dB) Cascaded operation, CH1 to CH2
AC:	5 Hz to 100 MHz (–3 dB) 5 Hz to 140 MHz (–6 dB) (unapplied × 5 GAIN mode) 7 Hz to 70 MHz (–3 dB), Cascaded operation, CH1 to CH2
Risetime:	3.5ns
Signal delay time:	Approx 10ns as displayed on CRT screen
Crosstalk:	–40 dB minimum
Operating modes:	
CH1	CH1, single trace
CH2	CH2, single trace
DUAL	CH1 and CH2, dual trace
ADD	CH1 + CH2 (added) display
QUAD	CH1 ~ CH4, quad trace
ALT	Dual or quad trace alternating
CHOP	Dual or quad trace chopped
CHOP frequency:	Approx 250 kHz, adjustable
Channel polarity:	Normal or inverted, CH2 only inverted
⚠ Maximum input voltage:	800 Vp-p or 400V (dc + ac peak)
Maximum undistorted amplitude:	8 divisions, minimum (DC to 100 MHz)
Bandwidth limiting:	Vertical system bandwidth with the 20 MHz BW pushbutton switch pushed is approximately 20 MHz
Delay time difference	
CH1 to CH2:	Less than 0.5ns
CH1, CH2 to CH3, CH4:	Less than 1ns

VERTICAL AXIS (Channel 3 and Channel 4 common specifications)

Sensitivity	0.1V/div, 1V/div ±2%
Attenuator:	1/1, 1/10
Input resistance:	1 MΩ ±1%
Input capacitance:	Approx. 22 pF
Input coupling mode:	DC only
Frequency response:	DC to 100 MHz (–3 dB) DC to 140 MHz (–6 dB)
Risetime:	3.5ns
Signal delay time:	Same as CH1 and CH2
Maximum allowable voltage	
DC component:	±0.5V or less (ac + dc) (±5V, 1/10 attenuated)
AC component:	1 Vp-p (10 Vp-p, 1/10 attenuated) or less
⚠Maximum input voltage:	400V (dc + ac peak)

HORIZONTAL AXIS (Channel 2 input)

Modes:	X-Y mode is switch selectable (HORIZ DISPLAY)
X-Y mode:	CH1: Y-axis CH2: X-axis
Sensitivity:	Same as CH2
Accuracy:	Same as CH2
Input resistance:	Same as CH2
Input capacitance:	Same as CH2
Frequency response:	
DC:	DC to 5 MHz (–3 dB) DC to 7 MHz (–6 dB)
AC:	5 Hz to 5 MHz (–3 dB) 5 Hz to 7 MHz (–6 dB)
X-Y phase difference:	Less than 3° at 100 kHz

SWEEP

Modes	(switchable with the HORIZ DISPLAY switch):
A	A sweep
ALT	B sweep waveform is displayed as an intensified portion of the A sweep and B sweep alternating
A-INT-B	B sweep waveform is displayed as an intensified portion of the A sweep.
B DLY'D	Delayed B sweep

SPECIFICATIONS

DUAL	Dual sweep – A and B sweeps, independently
X-Y	X-Y display mode
A sweep time:	20 ns/div to 0.5s/div in 23 ranges, in 1-2-5 sequence, verninier control provides fully adjustable sweep time between steps.
B sweep time:	20ns/div to 50ms/div in 20 ranges, in 1-2-5 sequence.
Accuracy:	±2% (10 ~ 35°C) ±4% (0 ~ 50°C)
Sweep magnification:	X10 ±5% (10 ~ 35°C) ±6% (0 ~ 50°C)
Linearity:	20ns/div to 0.5s/div ±3% (±5% with X10 magnification)
HOLDOFF:	Continuously adjustable for A sweep from NORM to X5
Trace separation:	B positionable up to 4 divisions separated from A sweep, continuously adjustable.
Delay method:	Continuous delay, Trigger delay
Delay time:	0.2 to 10 times the sweep time from 200ns to 0.5s, continuously adjustable.
Time difference measurement accuracy:	±(1% of measurement + 0.1% of full scale) (10 ~ 35°C) ±4% (0 ~ 50°C)
Delay jitter:	1/20000 of the full scale sweep time.

TRIGGERING

A TRIG

A trigger modes:	AUTO, NORM, SINGLE, FIX: at the center of the waveform
Trigger source:	V MODE, CH1, CH2, (EXT) CH3 1/1 and 1/10, LINE
Coupling modes:	AC, LFREJ, HFREJ, DC, VIDEO VIDEO-LINE sync automatically selected at sweep times of 50 µs/div to 20ns/div. VIDEO-FRAME sync automatically selected at sweep times of 0.5s/div to 0.1ms/div.
Trigger level:	±90° adjustable
Polarity:	+/–

B TRIG

B trigger modes:	STARTS AFTER DELAY, TRIGGERABLE AFTER DELAY
Trigger source:	CH1, CH2, (EXT) CH4 1/1 and 1/10
Coupling modes:	AC, LFREJ, HFREJ, DC
Trigger level:	±90° adjustable
Polarity:	+/–

TRIGGER SENSITIVITY (A AND B)

COUPLING	FREQ RANGE	MINIMUM SYNC AMPLITUDE		
		INT	EXT	EXT 1/10
DC	DC ~ 20 MHz	0.5 div	50 mV	0.5V
	DC ~ 50 MHz	1.0 div	100 mV	1.0V
	DC ~ 100 MHz	1.5 div	210 mV	2.1V
AC	Same as for DC but with increased minimum level for below 20 Hz.			
AC HFREJ	Increased minimum level below 20 Hz and above 30 kHz.			
AC LFREJ	Increased minimum level below 30 kHz.			
VIDEO	FRAME/LINE	0.5 div	50 mV	0.5V

Table-1

AUTO:	Same as above specifications for above 50 Hz.
FIX:	40 Hz ~ 20 MHz 1.0 div (100 mV) 40 Hz ~ 100 MHz 1.5 div (210 mV)
Jitter:	0.5ns maximum at 100 MHz 2ns/div sweep rate (X10 MAG on)

CALIBRATING VOLTAGE AND CURRENT

1 kHz	±3% Positive square wave
1V	±1% (10 ~ 35°C) ±2% (0 ~ 50°C)
10 mA	±2% (10 ~ 35°C) ±4% (0 ~ 50°C)

INTENSITY MODULATION

Input signal:	TTL level, intensity decreasing with more positive levels
Input impedance:	Approx. 10 kΩ
Usable frequency range:	DC to 10 MHz
⚠ Maximum input voltage:	50V (dc + ac peak)

VERTICAL AXIS OUTPUT

	Sampled CH1 output
Output voltage:	50 mVp-p/div (into 50Ω load)
Output impedance:	Approx. 50Ω
Frequency response:	DC to 100 MHz (–3 dB) (into 50Ω load)

GATE OPUTPUT (A and B)

Output voltage:	Approx. 1.5V positive gate (into 500Ω load)

TRACE ROTATION	Electrical, adjustable

POWER SUPPLY

Line voltage:	90 ~ 264 V
Line frequency:	45 ~ 400 Hz
Power consumption:	Approx. 55 W (into 100 V, 50 Hz)

SPECIFICATIONS

DIMENSIONS

Width:	284 mm (328 mm)
Height:	138 mm (150 mm)
Depth:	400 mm(471mm)
	( ) dimensions include protrusions from basic case outline dimensions.

WEIGHT	7.4 kg

ENVIRONMENT

Operating temperature and humidity for guaranteed specifications:	10 ~ 35°C, 85% maximum RH
Full operating range:	0 ~ 50°C, 90% maximum RH
Storage temperature and humidity range:	−20 ~ +70°C 80% maximum
Altitude:	
Operating:	5000 m
Non-operating:	12000 m

ACCESSORIES

STANDARD ACCESSORIES INCLUDED

Probe (PC-29) × 2	Y87-1250-00
Attenuation	1/10
Input Impedance	10MΩ, 18 pF of less
Instruction Manual	B50-7519-00
Handbook	B50-7521-00
AC Power Cord	See Fig. 3
Panel Cover	F07-0923-02
Probe Holder	J21-2903-03

OPTIONAL ACCESSORIES

Probe Pouch (MC-78)	Y87-1600-00
Service Manual	B51-1035-00
AC Power Cord	See Fig. 3

SPECIFICATIONS

CRT 150KTM31 SPECIFICATIONS

Screen and shape

Dimensions	
Overall length;	380 mm Max.
Face plate dimensions;	149.3 ±3.0 mm
Screen shape;	Rectangular flat face, internal graticule, metal back
Deflection and focusing system;	Electrostatic deflection, electrostatic focusing and post-deflection acceleration
Color;	Green
Persistence;	Midium short
Useful display area;	Y axis.....80 mm X axis.....100 mm
Heating	
Heater voltage;	6.0 V
Heater current;	75 mA
Weight;	Approx. 1.1 kg

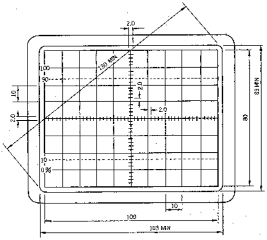

2.0
130 MIN
100
90
10
0%
1.0
2.0
2.0
2.0
80
83 MIN
10
100
103 MIN

Fig. 1

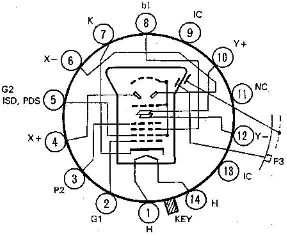

bl
8
K
7
IC
9
Y+
10
X−
6
NC
11
G2
ISD, PDS
5
X+
4
12
Y−
P3
3
P2
13
IC
2
G1
1
H
14
H
KEY

Fig. 2

SAFETY

SAFETY

Before connecting the instrument to a power source, carefully read the following information, then verify that the proper power cord is used and the proper line fuse is installed for power source. If the power cord is not applied for specified voltage, there is always a certain amount of danger from electric shock.

Line voltage

This instrument operates using ac-power input voltages that 90 V to 264 V at frequencies from 45 Hz to 400 Hz.

Power cord

The ground wire of the 3-wire ac power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered.
The optional power cords are shown as follows in Fig. 3.

Line fuse

The fuse holder is located on the rear panel and contains the line fuse. Verify that the proper fuse is installed by replacing the line fuse.

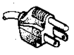
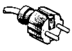
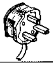
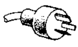
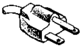
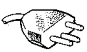
Plug configuration	Power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord
	North American 120 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow AGC/3AG	None	E30-1820-05
	Universal Europe 220 volt/50 Hz Rated 16 amp	1.2 A, 250 V Fast blow 5×20 mm	None	E30-1819-05
	U.K. 240 volt/50 Hz Rated 13 amp	1.2 A, 250 V Fast blow 5×20 mm	1.2 A Type C	–
	Australian 240 volt/50 Hz Rated 10 amp	1.2 A, 250 V Fast blow 5×20 mm	None	E30-1821-05
	North American 240 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow AGC/3AG	None	–
	Switzerland 240 volt/50 Hz Rated 10 amp	1.2 A, 250 V Fast blow AGC/3AG 5×20 mm	None	–

Fig. 3 Power Input Voltage Configuration

CIRCUIT DESCRIPTION

VERTICAL ATTENUATOR

The input attenuator unit has a three stage configuration; the attenuation factor of the first stage is 1/100, of the second stage 1/10 and of the third stage 1/2 and 1/4. In combination, these comprise a 10 point input attenuator in 1, 2 and 5 sequence.

The attenuator consists of resistors and capacitors only and does not vary the gain of amplifiers. For this reason, step attenuator balance adjustment is not required.

In addition, since a 1/1000 attenuator is not used, the frequency response is good. The attenuators in both channel 1 and channel 2 use the same configuration.

VERTICAL PRE-AMPLIFIER CIRCUIT

Since this model employs four channel operation, four preamplifiers are used.

In the first stage amplifier of channel 1, single-ended transistor amplifiers (Q1 - Q5) with improved high-frequency response are applied with the dc feedback by low offset, low drift op-amp (IC1) to produce a low drift wide-band amplifier.

From the second stage amplifier onward, the amplifier is of a differential configuration. In the second stage amplifier circuit, switching transistors Q13 and Q14 are switched to vary gain to perform X5 gain operation.

In the third stage amplifier circuit, the vertical position control (VR) is connected. Q17 is provided as a constant current source so that the average potential of the output of this stage will not vary if the vertical position control is turned. In channel 2, the phase is inverted by switching transistors Q49 and Q50 to perform channel 2 INV.

Q24 and Q25 are trigger amplifiers whose output passes through buffer output amplifiers Q27 and Q29, and the output signal with an output impedance of 50 ohms is fed to A trigger switch PC board. In channel 1, the CH1 OUT signal is output to the rear panel via Q26 and Q28.

The fourth stage amplifier circuit comprises a cascade amplifier together with mixing amplifiers Q62 and Q63. Channel 2 has a similar circuit configuration to that of channel 1. The second amplifier of channels 3 and 4 has a similar circuit configuration to that of the fourth amplifier of channel 1 and 2.

The four signals of channel 1 through 4 are selected by diode switches D7 through D10, D21 through D24 and D29 through D36 and are connected to the emitter of Q62 and Q63.

Q67 and Q68 are buffer amplifiers to obtain matching with the delay line. These amplifiers have superb CMRR (common mode rejection ratio) in order to provide a balanced output to the delay line and reduce distortion in the waveform of the delay line.

Q73 and Q74 are trigger amplifiers which output the output signal of the mixing amplifier to the A trigger switch unit and are V MODE trigger source. Q64 is a load resistor switching transistor during ADD mode.

Q69 through Q72 make up a 20 MHz band width circuit which sets the frequency response of the vertical axis to 20 MHz, (−3 dB).

The signals of channel 1 through 4 are appropriately switched by a combination of the vertical and horizontal modes by means of the logic circuit consisting of IC3 through IC7.

CH3, CH4 AMPLIFIER CIRCUIT

This circuit consists of the attenuator unit, buffer amplifier, first stage amplifier and trigger amplifier. Q1 drives relay RL1 to switch the attenuator unit to 1/1 and 1/10.

The output signal from this attenuator unit is converted in impedance by Q2 through Q4, amplified by Q5 and Q6, and fed to the second amplifier of the vertical pre-amplifier circuit. At the same time, the trigger signal is passed through trigger amplifiers Q7 and Q8, and applied to the A trigger switch unit.

Although channel 4 has an identical circuit to that of channel 3, the trigger signal is fed to the B trigger switch unit. On the same PC board, the wiring network connecting the CPU unit and trigger sweep unit to the HORIZ DISPLAY and TRIG MODE PC board is incorporated.

VERTICAL OUTPUT AMPLIFIER CIRCUIT

The signal passed through the delay line is applied to the vertical output amplifier. Q1 through Q4 are the cascade connection differential amplifiers. Q14 is a constant current biasing circuit. Q7 through Q12 are final stage output amplifiers; as the cases of Q11 and Q12 are mounted on the chassis to draw off heat, the heat radiation effect is improved compared with former final stage amplifiers. Q15, Q16 and Q17 make up the trace separation circuit, and Q13 and Q18 make up the beam finder circuit.

A TRIGGER SWITCH CIRCUIT

CH1, CH2, CH3, V MODE and LINE trigger signals are fed to the A trigger switch circuit. S1 is a trigger source select switch and S2 is a trigger coupling select switch. Q1 and Q2 are fixed sync circuits which detect the peak value of the trigger input signal to automatically set the trigger level.

Q3 is a dual FET to prevent temperature drift during the dc sync. Q4 and Q5 make up the emitter follower circuit which serves to lower the driving impedance for the following stage. Q6 and Q7 are feedback amplifiers which improve the CMRR (common mode rejection ratio) of both polarities of the trigger signal. Q8 and Q9 are circuits which prevent temperature drift. Q10 through Q15 are cascode amplifiers and make up a switching circuit of the negative and positive polarities of the trigger signal.

CIRCUIT DESCRIPTION

Q17 through Q25 are video sync circuits. Q17 through Q19 make up a switching circuit of the negative and positive polarities of the trigger signal and Q21 and Q22 make up a trigger waveshape circuit. Separation and selection of the vertical and horizontal sync signals are performed by Q24 which is interlocked with the SWEEP TIME/DIV control. Q16 receives the trigger signals from Q10 through Q15 or Q25 and feeds the trigger signal to the trigger sweep unit with an output impedance of 50 ohms.

B TRIGGER SWITCH CIRCUIT

Basically, this is the same as the A trigger switch circuit. However, the B trigger switch circuit does not have the video sync circuit and fixed sync circuit.

Q1 extracts the trigger signal of channel 2, then feeds the X signal to the trigger sweep unit during the X-Y operation.

ROTARY SWITCH CIRCUIT

This is part of the sweep circuit and is mounted on a separate PC board which the rotary switch for selecting the sweep time resistors and the resistors for the holdoff circuit are installed.

TRIGGER SWEEP CIRCUIT

The sweep circuit employs a constant current integrating circuit which charges capacitors with a constant current to provide sawtooth waves. Q13, Q15 and Q17 are switching transistors of capacitors for A sweep time. In the case of the B sweep, Q43, Q45 and Q47 operate in the same manner as in the A sweep.

Q12, Q14 and Q16 are switching transistors for holdoff capacitors of the A sweep. In the case of the B sweep, Q42, Q44 and Q46 operate in the same manner as in the A sweep. The voltage supplied from the constant voltage circuit is converted into the constant current source by the voltage setting circuit consisting of IC3a and Q7 and resistors switched by the rotary switch. The capacitor for the sweep time is charged by this current and its terminal voltage is increased. This voltage is fed to the high impedance buffer amplifier consisting of Q18 and Q19. When the output of this amplifier reaches a certain voltage, IC7d is turned on and the flip-flop IC2b is reset; at the same time, IC2a is set. The output of IC2a turns Q6 on, then short-circuits the capacitor for the sweep time with the result that its terminal voltage is decreased. The constant current circuit formed by Q20 charges any one of holdoff capacitors C12, C16 or C20. The terminal voltage of the capacitor gradually increases and when it reaches a certain value, Q22 turns on. The output of Q22 turns on the Schmitt trigger consisting of IC7c, setting IC2b. The output from IC2b releases IC2a setting and starts sweeping again.

The trigger signal is passed through IC1a and IC1b, then triggers IC2a and releases the set flip-flop to start the sweep which is in sync with the trigger signal. IC1a and IC1b make up the Schmitt trigger circuit.

The trigger signal shaped by IC1a and IC1b is applied to IC1c, Q1 and Q2. When the trigger signal is present, the gate of IC1d is closed and IC2a acts as a master-slave flip-flop. When the trigger signal disappears, as the gate of IC1d opens, IC2a acts as an R-S flip-flop. This is an auto free-running circuit.

Q24 through Q26 are the detection circuit for delayed sweep. When a voltage level detemined by the delay time multiplier is reached, Q24 turns on and the gate of IC8a is triggered. IC8a and IC10b make up the logic differentiating circuit which produces a pulse with a certain pulse width. This pulse sets IC5b and starts the B sweep. The B sweep circuit is almost the same as the A sweep circuit except that the B sweep circuit does not have three ranges of low speed sweep.

The B STARTS AFTER DELAY switch permits the gate of the IC4d to switch from the trigger priority master-slave flip-flop to the R-S flip-flop, and it is possible to start sweep from the voltage level determined by the delay time multiplier.

The A sweep is adjusted in horizontal position by Q53 while the B sweep is adjusted in horizontal position by Q54 and the horizontal display is switched by Q55 through Q58. The A and B sweep waveforms are synthesized at the collectors of Q55 and Q58. The X-Y signals also pass through Q59 where they are synthesized. The signal passed through Q60 is improved in CMRR with Q62 before it is fed to the following stage. The signals at Q64, Q65 and Q66, Q68 are switched by Q69 and Q68 respectively to X1 and X10, then converted in impedance to 50 ohms and fed to the horizontal final stage amplifier.

Q77 through Q79 is a trace separation circuit which supplies two types of bias voltage to the vertical output amplifier by means of the select signals of the A and B sweeps. IC8d is a reset pulse generating circuit during single sweep operation.

IC13a, 14a, and 14e also produce a blanking control signal when the horizontal axis is displayed. This signal is combined by IC11 and 12d with the sweep signal and chop signal, then converted in impedance by Q72 through Q75 to become an input signal to the blanking circuit.

The channel select signal during dual and quad traces in the vertical axis mode is produced by IC12a, IC12b, IC13b, IC14c, IC15a, IC15b, IC15c, IC15d, Q76 and D62 through D64.

IC12a and IC12b are chop oscillators. The on/off of these oscillators is controlled by the vertical axis mode logic and the signal from the CPU unit. While the oscillation is stopped, these oscillators output the alternate signal by receiving the signal from Q76. The output from IC12a and IC12b turns off during vertical axis single trace, and is output in all other modes. The output from IC15d is fed to the vertical pre-amplifier and becomes the chop signal and alternate signal.

CIRCUIT DESCRIPTION

CALIBRATION VOLTAGE GENERATOR CIRCUIT

Q80 and Q81 make up a multivibrator circuit, and the signal decreased in impedance by Q82 is output as a calibration voltage. This voltage is changed into constant current by R307 and R308 and output to the current calibration loop on the rear panel. The power sources to all these circuits are stabilized by IC16 before being supplied.

HORIZONTAL OUTPUT AMPLIFIER CIRCUIT

The sweep signal supplied from the trigger sweep circuit is amplified by differential amplifier Q1 and Q2. The output from Q1 and Q2 is converted in impedance by the emitter-follower circuit Q3 and Q4 and drives Q5 and Q6. Q7 and Q8 make up a constant current circuit. These circuits each serve as a dc load for Q5 and Q6, and are provided with ac peaking by means of C11 and C12. Q9 and Q10 make up an auto biasing circuit which automatically determines the operation point of the output stage, These circuits also serve as a beam finder circuit; when the base of Q11 is grounded, the operation point of the output stage decreases and serves to compress the output waveform.

CPU CIRCUIT

The control of vertical MODE, HORIZ DISPLAY and TRIG MODE is performed by the CPU.

By means of the software key scanning system, the signal corresponding to the mode switch pressed is processed, and "L" output is sent to each LED indicator and each unit as a control signal.

The CH2 INV signal and 20 MHz B.W. switching signal are individually fed to the CPU, and their LED indicators are activated by the circuit in the vertical pre-amplifier.

As the lithium battery serves as a memory back-up power supply, information is held in memory even when the power is switched off.

SWITCHING POWER SUPPLY UNIT

Although this unit aims is compact and lightweight, it consumes nearly 55 W power. Therefore, the conventional series regulator system using a power transformer is not able to meet the specification. For this reason, a switching regulator is employed in this unit.

This switching regulator directly rectifies a voltage of 90 - 264 V, whose output is then converted into a dc current by smoothing capacitors. Next, this dc current is switched by power transistors and converted into ac current to drive the converter transformer. The converter transformer has six taps on its secondary winding. The six ac outputs are each rectified and filtered and supply dc outputs to the power blanking unit. However, the voltage at the control winding is compared with the reference voltage, then amplified by the differential amplifier. The output from the differential amplifier controls the base of the power transistor as the control winding is separate and isolated from the primary winding, thereby stabilizing the output voltage from the secondary winding.

POWER BLANKING UNIT

Of the six voltages output from the switching power supply unit, five are stabilized by the series regulator again. Q1 and Q3 through Q6 are control transistors. IC1a, IC1b, IC2a and IC2b are differential amplifiers. With respect to the +20 V supply, as its stabilization is not so important, a voltage divider type regulator is used.

The dc-dc converter for high voltage employs the same circuit as conventional models. Q24 through Q26 make up a differential amplifier and Q28 is a control transistor. This scope allows the brightness of the A and B sweep to be varied independently. Q11 through Q13 are responsible for this operation.

Q14 is a beam finder circuit and even if the INTENSITY control is set to CCW., this circuit serves to provide trace on the CRT.

Q15 and Q16 make up an external intensity modulation circuit which darkens the screen of the CRT with "H" level signal of the TTL level.

These signals are synthesized at the base of Q17, and drive Q18. Q19 is a dc load for Q18 and is provided with ac peaking by C25.

Q20 and Q21 are an auto-focus circuit, and oposite phase signal to phase the blanking waveform is applied to the focus electrode of the CRT.

Q22 and Q23 are dc restorer circuit for the blanking and auto-focus circuits and configured as a differential amplifier, so that an isolated signal can be fed to each circuit. Q8 is a transistor for scale illumination, and Q9 and Q10 are transistors for trace rotation.

FILTER UNIT

L1 and C1 through C3 make up a line filter which prevents noise entering from the power line; the line filter also prevents the unit's internal signal radiating through the power line.

IC1 is a photocoupler which provides the trigger source for the line sync.

HIGH VOLTAGE BLOCK

The acceleration voltage at the subsequent stage of the unit extends to as much as 18 kV. Therefore, if the high voltage rectifier section is exposed, it is potentially dangerous. Besides, leakage current would not meet the safety standards. So, the unit employs a high voltage block whose high voltage rectifier section is solidified with resin. The dc-dc converter transformer and the rectifier circuit for 2 kV cathode voltage are incorporated in this block. The external output includes −2 kV dc, 6 V ac and 18 kV, which are output from the anode cap. Therefore, unless the anode cap is intentionally removed, as all other voltages are dc output, the high voltages are in the order of approx. 1/2 to 1/3 as compared with our former oscilloscope models, thereby eliminating danger.

ASTIGMATISM CONTROL UNIT

In the power blanking unit, the variable resistor for trace rotation and the variable resistor for astigmatism control are mounted on a separate PC board to allow these controls to be adjusted on the front panel.

BLOCK DIAGRAM

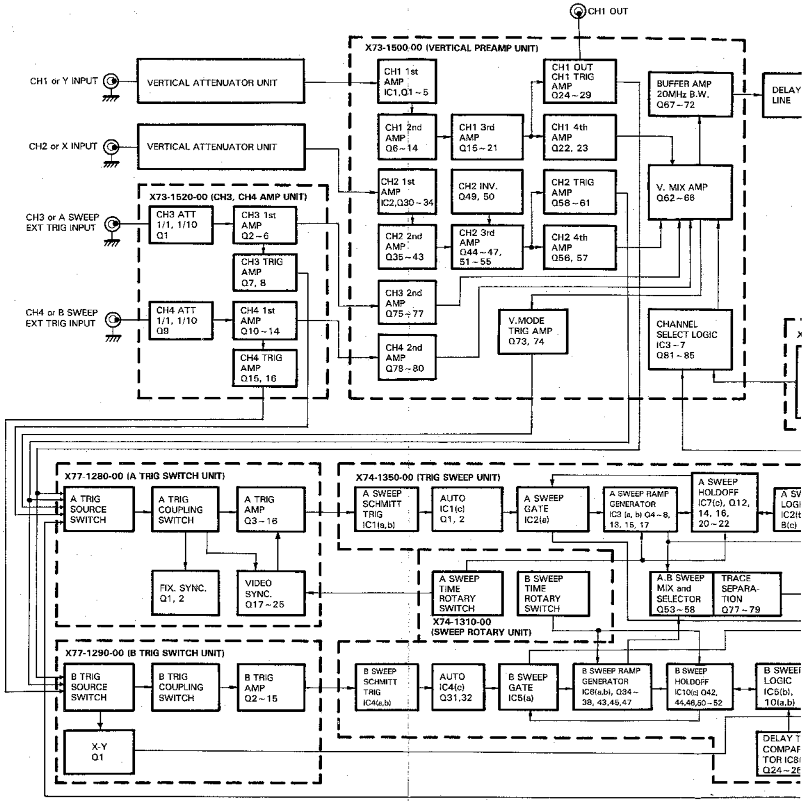

CH1 OUT
X73-1500-00 (VERTICAL PREAMP UNIT)
CH1 or Y INPUT
VERTICAL ATTENUATOR UNIT
CH2 or X INPUT
VERTICAL ATTENUATOR UNIT
X73-1520-00 (CH3, CH4 AMP UNIT)
CH3 or A SWEEP EXT TRIG INPUT
CH3 ATT 1/1, 1/10 Q1
CH3 1st AMP Q2～6
CH3 TRIG AMP Q7, 8
CH4 or B SWEEP EXT TRIG INPUT
CH4 ATT 1/1, 1/10 Q9
CH4 1st AMP Q10～14
CH4 TRIG AMP Q15, 16
CH1 1st AMP IC1,Q1～5
CH1 2nd AMP Q6～14
CH1 3rd AMP Q15～21
CH1 OUT CH1 TRIG AMP Q24～29
CH1 4th AMP Q22, 23
CH2 1st AMP IC2,Q30～34
CH2 INV. Q49, 50
CH2 TRIG AMP Q58～61
CH2 2nd AMP Q35～43
CH2 3rd AMP Q44～47, 51～55
CH2 4th AMP Q56, 57
CH3 2nd AMP Q75～77
CH4 2nd AMP Q78～80
V.MODE TRIG AMP Q73, 74
BUFFER AMP 20MHz B.W. Q67～72
DELAY LINE
V. MIX AMP Q62～66
CHANNEL SELECT LOGIC IC3～7 Q81～85
X77-1280-00 (A TRIG SWITCH UNIT)
A TRIG SOURCE SWITCH
A TRIG COUPLING SWITCH
A TRIG AMP Q3～16
FIX. SYNC. Q1, 2
VIDEO SYNC. Q17～25
X74-1350-00 (TRIG SWEEP UNIT)
A SWEEP SCHMITT TRIG IC1(a,b)
AUTO IC1(c) Q1, 2
A SWEEP GATE IC2(a)
A SWEEP RAMP GENERATOR IC3 (a, b) Q4～8, 13, 15, 17
A SWEEP HOLDOFF IC7(c), Q12, 14, 16, 20～22
A SW LOGI IC2(t B(c)
A SWEEP TIME ROTARY SWITCH
B SWEEP TIME ROTARY SWITCH
X74-1310-00 (SWEEP ROTARY UNIT)
A.B SWEEP MIX and SELECTOR Q53～58
TRACE SEPARA-TION Q77～79
X77-1290-00 (B TRIG SWITCH UNIT)
B TRIG SOURCE SWITCH
B TRIG COUPLING SWITCH
B TRIG AMP Q2～15
X-Y Q1
B SWEEP SCHMITT TRIG IC4(a,b)
AUTO IC4(c) Q31,32
B SWEEP GATE IC5(a)
B SWEEP RAMP GENERATOR IC8(a,b), Q34～38, 43,45,47
B SWEEP HOLDOFF IC10(c) Q42, 44,46,50～52
B SWEE LOGIC IC5(b), 10(a,b)
DELAY T COMPAR TOR IC8 Q24～26

Fig. 4

BLOCK DIAGRAM

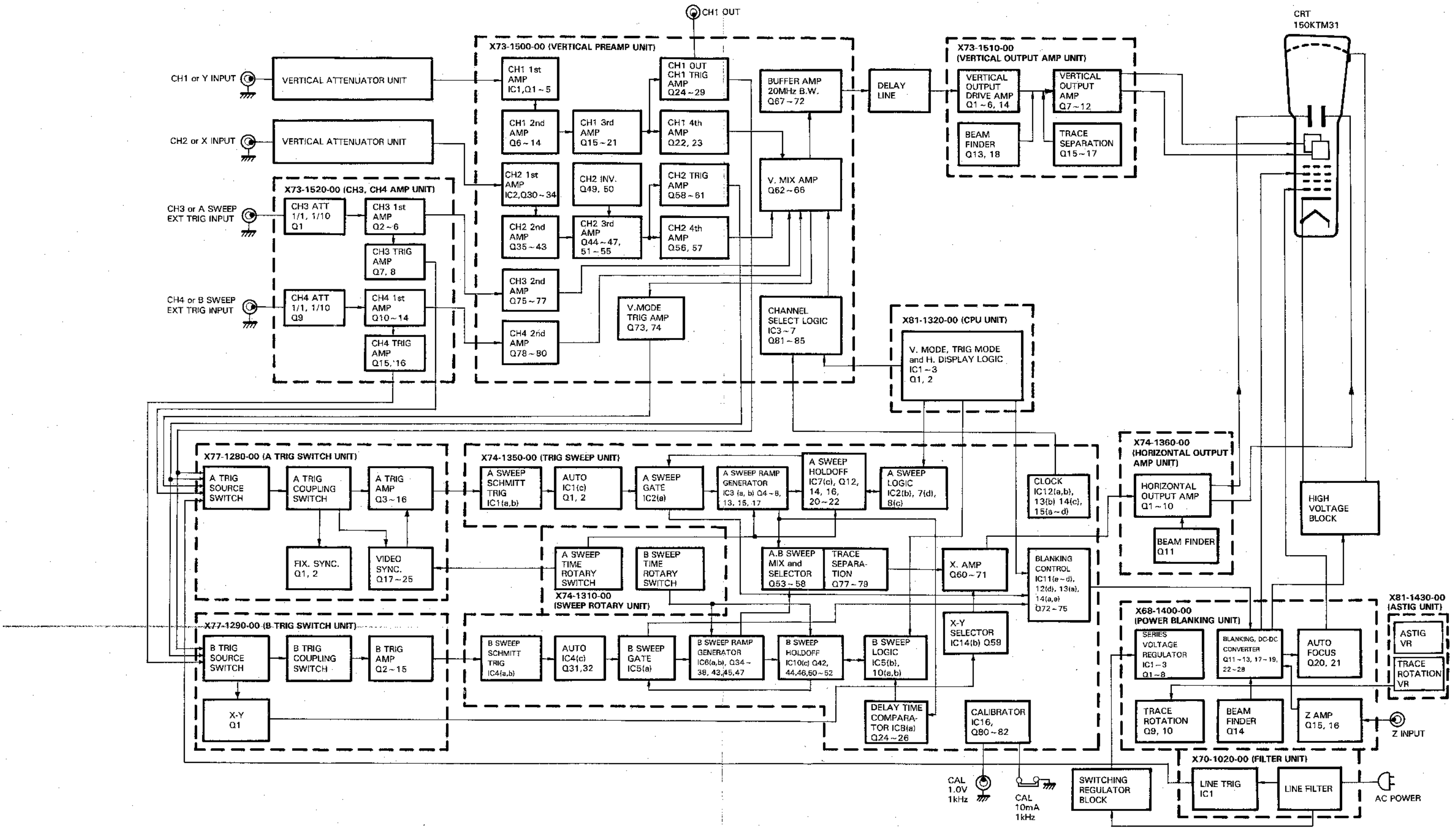

CH1 OUT
CRT
150KTM31
CH1 or Y INPUT
VERTICAL ATTENUATOR UNIT
CH2 or X INPUT
VERTICAL ATTENUATOR UNIT
CH3 or A SWEEP EXT TRIG INPUT
CH4 or B SWEEP EXT TRIG INPUT
X73-1520-00 (CH3, CH4 AMP UNIT)
CH3 ATT 1/1, 1/10 Q1
CH3 1st AMP Q2~6
CH3 TRIG AMP Q7, 8
CH4 ATT 1/1, 1/10 Q9
CH4 1st AMP Q10~14
CH4 TRIG AMP Q15, 16
X73-1500-00 (VERTICAL PREAMP UNIT)
CH1 1st AMP IC1, Q1~5
CH1 2nd AMP Q6~14
CH1 3rd AMP Q15~21
CH1 OUT CH1 TRIG AMP Q24~29
CH1 4th AMP Q22, 23
CH2 1st AMP IC2, Q30~34
CH2 INV. Q49, 50
CH2 TRIG AMP Q58~61
CH2 2nd AMP Q35~43
CH2 3rd AMP Q44~47, 51~55
CH2 4th AMP Q56, 57
CH3 2nd AMP Q75~77
CH4 2nd AMP Q78~80
V.MODE TRIG AMP Q73, 74
BUFFER AMP 20MHz B.W. Q67~72
V. MIX AMP Q62~66
CHANNEL SELECT LOGIC IC3~7 Q81~85
DELAY LINE
X73-1510-00 (VERTICAL OUTPUT AMP UNIT)
VERTICAL OUTPUT DRIVE AMP Q1~6, 14
VERTICAL OUTPUT AMP Q7~12
BEAM FINDER Q13, 18
TRACE SEPARATION Q15~17
X81-1320-00 (CPU UNIT)
V. MODE, TRIG MODE and H. DISPLAY LOGIC IC1~3 Q1, 2
X77-1280-00 (A TRIG SWITCH UNIT)
A TRIG SOURCE SWITCH
A TRIG COUPLING SWITCH
A TRIG AMP Q3~16
FIX. SYNC. Q1, 2
VIDEO SYNC. Q17~25
X74-1350-00 (TRIG SWEEP UNIT)
A SWEEP SCHMITT TRIG IC1(a,b)
AUTO IC1(c) Q1, 2
A SWEEP GATE IC2(a)
A SWEEP RAMP GENERATOR IC3 (a, b) Q4~8, 13, 15, 17
A SWEEP HOLDOFF IC7(c), Q12, 14, 16, 20~22
A SWEEP LOGIC IC2(b), 7(d), 8(c)
CLOCK IC12(a,b), 13(b) 14(c), 15(a~d)
A SWEEP TIME ROTARY SWITCH
B SWEEP TIME ROTARY SWITCH
X74-1310-00 (SWEEP ROTARY UNIT)
A.B SWEEP MIX and SELECTOR Q53~58
TRACE SEPARA-TION Q77~79
X. AMP Q60~71
BLANKING CONTROL IC11(a~d), 12(d), 13(a), 14(a,e) Q72~75
X-Y SELECTOR IC14(b) Q59
X74-1360-00 (HORIZONTAL OUTPUT AMP UNIT)
HORIZONTAL OUTPUT AMP Q1~10
BEAM FINDER Q11
HIGH VOLTAGE BLOCK
X77-1290-00 (B TRIG SWITCH UNIT)
B TRIG SOURCE SWITCH
B TRIG COUPLING SWITCH
B TRIG AMP Q2~15
X-Y Q1
B SWEEP SCHMITT TRIG IC4(a,b)
AUTO IC4(c) Q31,32
B SWEEP GATE IC5(a)
B SWEEP RAMP GENERATOR IC6(a,b), Q34~38, 43,45,47
B SWEEP HOLDOFF IC10(c) Q42, 44,46,50~52
B SWEEP LOGIC IC5(b), 10(a,b)
DELAY TIME COMPARA-TOR IC8(a) Q24~26
CALIBRATOR IC16, Q80~82
CAL 1.0V 1kHz
CAL 10mA 1kHz
X68-1400-00 (POWER BLANKING UNIT)
SERIES VOLTAGE REGULATOR IC1~3 Q1~8
BLANKING, DC-DC CONVERTER Q11~13, 17~19, 22~28
AUTO FOCUS Q20, 21
TRACE ROTATION Q9, 10
BEAM FINDER Q14
Z AMP Q15, 16
Z INPUT
X81-1430-00 (ASTIG UNIT)
ASTIG VR
TRACE ROTATION VR
X70-1020-00 (FILTER UNIT)
LINE TRIG IC1
LINE FILTER
AC POWER
SWITCHING REGULATOR BLOCK

Fig. 4

MAINTENANCE

REMOVAL OF CASE

1. Remove the 4 screws located at the rear of the case and the 1 located at bottom with a ⊕ screwdriver. Carefully slide the body forward from the case.
2. To install the body in the case, place the case horizontally and slide the body into the case using the rails located at the bottom of the case. Then, place the body vertically and engage the case front edge into the front panel groove.
3. Temporarily insert the case retaining screws and then tighten them evenly.

CAUTION:
A voltage of 20 kV is applied to the CRT socket and anode cap. Before removing the case, turn the power off and pull out the power plug. After removing the case, take care not to touch them.

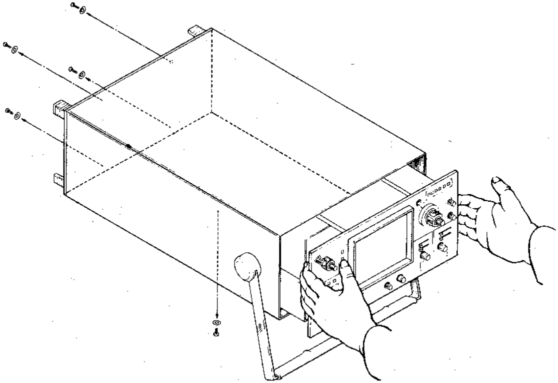


Fig. 5

REMOVING/INSTALLING CRT

1. To remove the cathode ray tube for servicing, disconnect the parallel cord connector located at the top of the shield case. Remove the screws securing the shield case.

   Remove the bracket screws without loosening the CRT band, move the CRT backward and remove the CRT by lifting up the socket.
2. To install the CRT, move the CRT together with the shield case to the front and tighten the screws securing the CRT band and shield case.
3. As slots are provided in the CRT brackets and the brackets are inclined by 45°, the CRT can be moved back and forth and right and left and positioned at any position.

   Always secure the CRT band first, then the CRT brackets.

CAUTION:
There is a high tension voltage at the anode of the CRT. Before removing the CRT, connect the anode to the ground via a 100 kΩ load for 5 seconds to discharge the voltage.

TROUBLESHOOTING

1. If one of the mode LEDs does not light, the unit will not operate correctly. When using the unit, confirm that the LED lights up.
2. To service the unit effectively, isolate the falure first. Then, remove the case and check the wiring, P.C.B. pattern and parts.

ADJUSTMENT

To obtain the best performance, periodically accurately calibrate the unit.

Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated.

When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.

The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer.

For optimum adjustment, turn the power on are warm up the scope sufficiently (more than 30 minutes) before starting.

NOTE:
Calibrate the unit under the following condition.
Temperature: 10 – 35°C
Hunmidity: Less than 85%

POWER SUPPLY VOLTAGE

Before calibrating the unit check the power supply voltage. (90 ~ 264 V).

TEST EQUIPMENT REQUIRED

The following instrument of their equivalent should be used for making adjustments.

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-720 (TRIO)	Impedance: More than 10MΩ, Measuring range: 0.01 V to 199V
Sine Wave Generator	SG-502 (Tektronix)	Frequency: 10 Hz to 10MHz, constant voltage over tuning range
Sine Wave Generator	SG-503 (Tektronix)	Frequency:50kHz to 100MHz, Output impedance: 50 Ω, constant voltage over tuning range.
Square Wave Generator	PG-506 (Tektronix)	Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ±1%, Rise time: 35ns or less (1 MHz, 1ns or less)
Q Meter	4343B (YHP)	–
Color Pattern Generator	CG-911A (TRIO)	–
Oscilloscope	475A (Tektronix)	Sensitivity: More than 5 mV Frequency response: More than 250 MHz
Time Marker Generator	TG-501 (Tektronix)	Time mark: 0.5s to 0.1 μs repetitive waveform, Accuracy: within 0.1%
High Voltage Probe	–	Input Impedance: 1000 MΩ
Termination	TA-57 (TRIO)	Impedance: 50 Ω
Attenuator	011-0059-02 (Tektronix)	–20 dB attenuation (50 Ω)

Table-2

Test Equipment	Model	Minimum Specification
Power Meter	2041 (YEW)	–
Auto transformer (variable)	SD-265 (Matsunaga)	–
Current Probe	P6302 AM-503 (Tektronix)	–
Frequency Counter	FC-756 (TRIO)	–

Table-3

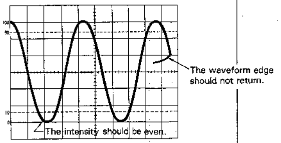
PREPARATION FOR ADJUSTMENT

Control Setting

The control settings listed below must be used for each adjustment procedure. Exceptions to these settings will be noted as they occur. After completing a adjustment, return the controls to the following settings.

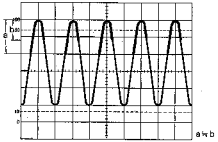
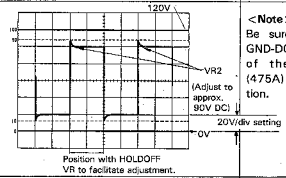
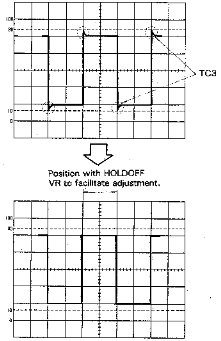
Power Section	
POWER	ON
CRT Control Section	
A INTENSITY	Between 12 and 3 o'clock position
B INTENSITY	Between 12 and 3 o'clock position
FOCUS	Optimum position
SCALE ILLUM	Arbitrary position
BEAM FIND	OFF
Vertical Section	
VARIABLE (CH1 and CH2)	CAL
▲▼ POSITION (CH1 ~ CH4)	12 o'clock position
AC-GND-DC (CH1 and CH2)	AC
VOLTS/DIV (CH1 and CH2)	5V/DIV
×5 GAIN	OFF (PUSH)
Horizontal Sweep Section	
A SWEEP TIME/DIV	0.1ms/DIV
B SWEEP TIME/DIV	0.1ms/DIV
A VARIABLE	CAL
DELAY TIME MULT	Arbitrary position
▲▼ TRACE SEP.	Fully CCW
HOLDOFF	NORM
B ENDS A	OFF
◄► POSITION	12 o'clock position
FINE PULL×10 MAG	12 o'clock position (×10 MAG OFF)
PULL CHOP F. SELECT	OFF (PUSH)
TRIG. Section	
A SOURCE	V MODE
A COUPLING	AC
A LEVEL	12 o'clock position
A SLOPE	+
FIX	(PUSH)
B SOURCE	CH1
B COUPLING	AC
B LEVEL	12 o'clock position
B SLOPE	+
STARTS AFTER DELAY	(PUSH)
Mode Section	
Vertical MODE	CH1
20 MHz BW	OFF
CH2 INV	OFF
TRIG MODE	AUTO
HORIZ DISPLAY	A

ADJUSTMENT

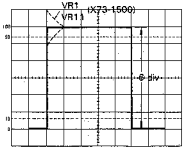
<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B. No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td colspan="8">ADJUSTMENT OF POWER SUPPLY AND CRT</td></tr>
<tr><td>Check of Power Supply</td><td></td><td>X68-1400</td><td>475A
DL-720</td><td></td><td>(1) Measurement and checking of voltages at P27 and P30 pins
<table>
<tr><th></th><th>1P</th><th>2P</th><th>3P</th><th>4P</th><th>5P</th><th>6P</th><th>7P</th><th>8P</th></tr>
<tr><td>P27</td><td>+120V</td><td>+55±1V</td><td>20V</td><td></td><td></td><td>5.2V</td><td>10V</td><td>−10V</td></tr>
<tr><td>P30</td><td>+130V±3V</td><td>55V</td><td>24V±2V</td><td></td><td>12V
+1.5V−0.5V</td><td>7V±0.5V</td><td>−12V
+0.5V−1.5V</td><td></td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Adjustment of −2.0 kV</td><td>VR3</td><td>X68-1400</td><td>DL-720
High voltage probe</td><td></td><td>(2) Measure the voltage on 2P of P33 and adjust VR3 to obtain −2.00kV (−2.00kV ~ −2.005kV).</td><td></td><td></td></tr>
<tr><td>Coarse Adjustment of ASTIG and FOCUS</td><td>VR9
FOCUS Knob</td><td>X81-1430</td><td></td><td>HORIZ DISPLAY: X-Y
CH1, CH2 AC-GND-DC: GND
A INTENSITY: 3 o'clock
20MHz BW: ON</td><td>(1) Operate ⬍ POSITION knobs for CH1 and CH2 to position the spot in the center of the CRT screen.
(2) Adjust VR9 to make the spot round and smaller.</td><td></td><td></td></tr>
<tr><td>Adjustment of A INTENSITY</td><td>VR1</td><td>X68-1400</td><td></td><td>HORIZ DISPLAY: X-Y
A INTENSITY: 9 o'clock
CH1, CH2 AC-GND-DC: GND
20MHz BW: ON</td><td>Adjust VR1 so that the spot on the CRT screen disappears when A INTENSITY is set in the position of 9 o'clock.
<Check>
Make sure that the spot on the CRT screen increases in brightness when A INTENSITY is turned CW and that the trace becomes almost extinguished when A INTENSITY is turned CCW (9 o'clock position).</td><td></td><td></td></tr>
<tr><td>Check of B INTENSITY</td><td></td><td></td><td></td><td>HORIZ DISPLAY: ALT
Vertical MODE: CH1
TRIG MODE: AUTO
STARTS AFTER DELAY: PULL
CH1 AC-GND-DC: AC
B SWEEP TIME/DIV: 0.1ms</td><td>(1) Operate ⬍ TRACE SEP to cause B sweep line in the center of the CRT screen.
(2) Make adjustment so that the trace on the CRT screen increases in brightness when B INTENSITY is turned CW and that the trace becomes extinguished when B INTENSITY is turned to fully CCW.
(3) Make adjustment so that the trace becomes extinguished when B INTENSITY is turned to fully CCW.</td><td></td><td></td></tr>
<tr><td>Adjustment of Blanking</td><td>TC2</td><td>X68-1400</td><td>SG-502</td><td>HORIZ DISPLAY: A
Vertical MODE: CH1
TRIG MODE: AUTO
A SOURCE: V MODE
A COUPLING: AC
A INTENSITY : Fully CW
CH1 AC-GND-DC: AC
A SWEEP TIME/DIV: 0.02μs</td><td>(1) Apply a sine wave signal of 10 MHz to CH1 INPUT and operate ⬍ POSITION, ◄► POSITION and CH1 VOLTS/DIV to bring out a waveform with a vertical amplitude of 6 div on the screen.
(2) Make adjustment so that there is no unevenness in intensity of the trace at the waveform starting point and there is no retrace.</td><td>
100
90
10
0
The waveform edge should not return.
The intensity should be even.

</td><td></td></tr>
<tr><td>Adjustment of Z-axis Input Blanking</td><td>TC1</td><td>X68-1400</td><td>SG-503</td><td>HORIZ DISPLAY: A
Vertical MODE: CH1
TRIG MODE: AUTO
A SOURCE: V MODE
CH1 AC-GND-DC: DC
VOLTS/DIV: 2V</td><td>(1) Set A SWEEP TIME/DIV at 0.5 μs and apply a 1 MHz sine wave signal of 10Vp-p to CH1 INPUT so that a waveform with a vertical amplitude of 5 div appears on the screen.
(2) Apply the same signal above to the Z INPUT, and turn A INTENSITY CCW so that the dark and bright area of the waveform are distinct.
(3) Adjust so that the bright area of the sine waveform is symmetrical to the peak point.</td><td></td><td></td></tr>
</table>

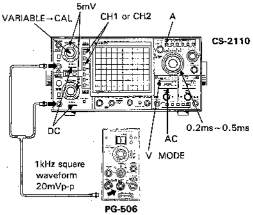
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
							
Adjustment of Auto FOCUS Level	VR2	X68-1400	475A Probe (1/10)	HORIZ DISPLAY: A A INTENSITY: Fully CW TRIG MODE: AUTO Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV:20μs HOLDOFF: NORM	(1) Set the oscilloscope (475A) for the vertical axis sensitivity at 2V/div. (2) Observe the waveform of AUTO FOCUS circuit (Autofocus test point FTP marked pattern) with a probe and make adjustment so that DC level of top of the square wave is approx. 90V (4.5～5 div.)		**<Note>** Be sure that the AC-GND-DC selector switch of the oscilloscope (475A) is at "DC" position.
Adjustment of Auto FOCUS Wave Forming	TC3	X68-1400		HORIZ DISPLAY: A A INTENSITY: Fully CW TRIG MODE: AUTO Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 20μs HOLDOFF: NORM	Make adjustment so that the above-mentioned circuit has an ideal waveform.		
Adjustment of ASTIG and FOCUS	VR9 FOCUS Knob	X81-1430		HORIZ DISPLAY: X-Y CH1, CH2 AC-GND-DC: GND A INTENSITY : 3 o'clock	(1) Operate ⇕ POSITION for CH1 and CH2 so that the bright spot is brought into the center of the CRT screen. (2) Make adjustment to make the spot round and smaller. **<Check>** (1) Make sure that the bright spot grows larger when the FOCUS knob is turned CW or CCW. (2) Make sure that the FOCUS knob is in a position within the range of 9 and 3 o'clock when the spot is smallest. (3) The most ideal point should be obtained by repeating the above operations and adjustment.		**<Note>** Be sure to bring the bright spot into the center of the CRT screen. It may be difficult to obtain the correct adjusting position near the edge of the screen due to the CRT peripheral blur.

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of Trace Rotation	VR8	X81-1430		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND	(1) Operate ↕ POSITION for CH1 to move the trace to the center of the CRT screen. (2) Make adjustment to align the trace with the horizontal center graticule line. **<Check>** (1) Make sure that the trace moves more than 0.5 div (10°) up and down from the horizontal center graticule line at its righthand end.		**<Note>** When the trace does not appear fully across the screen, make proper adjustment by operating VR9 (X74-1350) and VR7 (X74-1350).
Adjustment of CRT Center	VR3	X73-1510		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND	Short-circuit the test point of X73-1500 and adjust VR3 so that the trace becomes aligned with the horizontal center graticule line.		
ADJUSTMENT OF VERTICAL AXIS (I)							
Adjustment of CH1 DC BAL	VR2	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND CH1 VOLTS/DIV: 5mV CH1 X5 GAIN: PULL	(1) Turn CH1 VARIABLE knob to fully CCW. (2) Adjust CH1 ↕ POSITION so that the trace becomes aligned with the horizontal center graticule line on the CRT screen. (3) Turn CH1 VARIABLE to CAL and make adjustment so that the trace becomes aligned with the horizontal center graticule line on the CRT screen. (4) Repeat the above procedure. **<Check>** Movement of trace | less than 0.3 div.		**<Note>** If the trace does not come to the center of the screen even when ↕ position is operated, adjust VR6 (X73-1500).
Adjustment of CH2 DC BAL	VR12	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO CH2 AC-GND-DC: GND CH2 VOLTS/DIV: 5mV CH2 X5 GAIN: PULL	Same with the adjustment of CH1 DC BAL.		**<Note>** CH2 position center can be adjusted by VR16 (X73-1500).
CH1 Waveform Shaping in the Low Range (5mV range)	VR1	X73-1500	BNC-BNC cord PG-506	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV CH1 VARIABLE: CAL	(1) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) Adjust VR1 to shape the square waveform in the low range.		
CH2 Waveform Shaping in the Low Range (5mV range)	VR11	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO A SOURCE: V MODE CH2 AC-GND-DC: GND CH2 VOLTS/DIV: 5mV CH2 VARIABLE : CAL	With vertical MODE selected to CH2, perform the same operations as described above to make adjustment.		

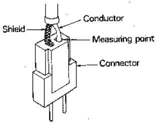
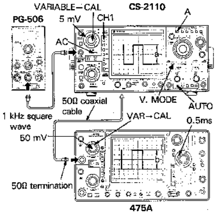
ADJUSTMENT

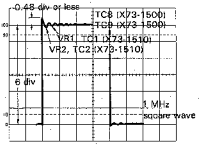
Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of CH1 Gain	VR7	X73-1500	BNC-BNC cord (T junction) PG-506	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV CH1 VARIABLE: CAL 20MHz BW: ON	(1) Apply a square wave signal of 20 mVp-p, 1 kHz to CH1 and CH2 INPUT. (2) Vertical MODE select to CH1 and operate CH1 ↕ POSITION to produce a waveform in the center of the CRT screen. (3) Synchronize by operating A trigger LEVEL. (4) Adjust VR7 so that the vertical amplitude of the waveform becomes 4 div. **<Check>** Turn CH1 VOLTS/DIV and input a reference signal so that the vertical amplitude will be 4 to 6 div in each range. Sensitivity error | within ±2%	 5mV VARIABLE→CAL CH1 or CH2 A CS-2110 DC 0.2ms~0.5ms AC V MODE 1kHz square waveform 20mVp-p PG-506	**<Refrence>** Method of calculatin of sensitivity error Sensitivity error = $\frac{a-b}{b}$ ×100% a = CRT screen amplitude b = Input signal voltage : (VOLTS/DIV) (Example): CRT screen amplitude: 4.2 div Input signal: 20mVp-p 1 kHz square wave VOLTS/DIV: 5mV Sensitivity error = $\frac{4.2\text{div}-20\text{mV}/5\text{mV}}{20\text{mV}/5\text{mV}}$ ×100 = 5%
Adjustment of CH2 Gain	VR18	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO A SOURCE: V MODE CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV CH2 VARIABLE: CAL 20MHz BW: ON	(1) With vertical MODE selected to CH2, turn VOLTS/DIV to 5 mV and perform the same operations as described above to make adjustment and check. **<Check>** (1) Select vertical MODE to DUAL and ALT position and turn VOLTS/DIV for CH1 and CH2 and apply a square wave of 20 mVp-p, 1 kHz to CH1 and CH2 INPUT jacks. Make sure that CH1 and CH2 have the same amplitude. (2) Switch vertical MODE to ADD and A SOURCE to CH1 (CH2) and press CH2 INV pushbutton switch (the lamp will go on when this switch is pressed). Operate ↕ POSITION for CH1 and CH2 to produce a single trace in the center of the CRT screen. If a single and straight trace cannot be obtained, adjust VR7 again. Channel error | within 2%		**<Note>** Overshoot or tilt might appear to the reference signal of 1 kHz square wave. In this case, make corase adjustment of square wave characteristics.
Adjustment of CH3 Gain and CH4 Gain	VR21 VR23	X73-1500 X73-1500	PG506	HORIZ DISPLAY: A Vertical MODE: QUAD, ALT A SOURCE: 1/1 B SOURCE: 1/1 A SWEEP TIME/DIV: 0.2ms TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND	(1) Apply a 0.5Vp-p, 1 kHz square wave signal simultaneously to CH3 and CH4 INPUT jacks and adjust A trigger LEVEL and B trigger LEVEL to obtain synchronization. Operate CH3 and CH4 ↕ POSITION controls to bring the pattern to the center of the CRT screen. (2) Make adjustment so that the amplitude of CH3 and CH4 waveforms becomes 5 div respectively. **<Check>** (1) Sensitivity error must be within ±2%. (See to reference for the adjustment of CH1 Gain) (2) With A SOURCE and B SOURSE switches set to 1/10, make the 1 kHz square wave signal 5 Vp-p and operate CH3 and CH4 ↕ POSITION controls to bring the waveform to the center of the CRT screen. The amplitude at this time must be within the range of 4.9~5.1 div.		**<Note>** If tilt or overshoot occurs to the 1 kHz waveform, refer to the section devoted to CH3 and CH4 waveform shaping.

ADJUSTMENT

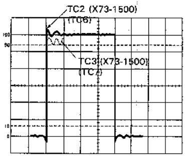
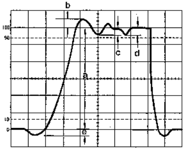
Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of CH1 ↕ POSITION and CH2 ↕ POSITION	VR6 VR16	X73-1500 X73-1500		Vertical MODE: DUAL, ALT HORIZ DISPLAY: A TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND CH1, CH2 ↕ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR6 and VR16 so that the CH1 and CH2 traces become aligned with the horizontal center graticule line on the CRT screen. **<Check>** (1) The deviation from the horizontal center graticule line on the CRT screen must be within ±1 div. (2) When ↕ POSITION controls for both CH1 and CH2 are turned fully CW, each trace must move upward more than 4 div and when the knobs are turned fully CCW the trace must move downward more than 4 div.		
Adjustment of CH2 INV Position	VR17	X73-1500			Press CH2 INV (the lamp is on) and adjust VR17 to bring the trace to its position at CH2 NORM (the lamp is off). **<Check>** (1) Vertical deviation between CH2 NORM and INV must be within ±0.5 div (2) Press CH2 INV and turn CH2 ↕ POSITION fully CW and see if the trace moves more than 4 div upward and it moves more than 4 div downward when the knob is turned fully CCW.		
Adjustment of CH3 ↕ POSITION and CH4 ↕ POSITION	VR22 VR24	X73-1500 X73-1500		HORIZ DISPLAY: A Vertical MODE: QUAD, ALT A SOURCE: 1/1 B SOURCE: 1/1 TRIG MODE: AUTO CH3, CH4 ↕ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR22 and VR24 so that the CH3 and CH4 traces become aligned with the horizontal center graticule line on the CRT screen. **<Check>** (1) The deviation from the horizontal center graticule line on the CRT screen must be within ±1 div. (2) When ↕ POSITION controls for both CH3 and CH4 are turned fully CW, each trace must move upward more than 4 div and when the knobs are turned fully CCW, each trace must move downward more than 4 div.		
Adjustment of CH1 X5 Gain and CH2 X5 Gain	VR4 VR14	X73-1500 X73-1500	PG-506	HORIZ DISPLAY: A Vertical MODE: DUAL, ALT TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: DC CH1, CH2 X5 GAIN: PULL A SWEEP TIME/DIV: 0.2ms CH1, CH2 VARIABLE: CAL	(1) Apply a square wave signal of 5 mVp-p, 1 kHz to CH1 INPUT and make adjustment so that the CRT screen amplitude becomes 5 div. (2) Apply the same signal to CH2 and make the similar adjustment. **<Check>** (1) The sensitivity error must be within ±2% (2) For both CH1 and CH2, the lamp must go on when PULL X5 GAIN is pulled and go off when the knob is pressed. (3) The UNCAL lamp must go off when CH1 and CH2 VARIABLE controls are operated to CAL and go on when the knobs are turned to UNCAL. (CCW)		**<Note>** If no waveform appears on the screen when the knob is pulled, make coarse adjustment by operating X5 Gain Position Adjustment. CH1: VR5 (X73-1500) CH2: VR15 (X73-1500)
Adjustment of CH1 X5 Gain Position and CH2 X5 Gain Position	VR5 VR15	X73-1500 X73-1500		HORIZ DISPLAY: A Vertical MODE: DUAL, ALT TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND CH1, CH2 X5 GAIN: PULL CH1, CH2 ↕ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR5 and VR15 so that the traces of CH1 and CH2 become aligned with the horizontal center graticule line on the CRT screen. **<Check>** The distance from the center graticule line must be within ±1 div.		**<Note>** If sometimes happens that the trace grows thicker at X5 GAIN, thus making it difficult to obtain proper adjustment. In this case, press 20 MHz BW (the lamp is on) button switch to make the line thinner.

ADJUSTMENT

<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B. No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td>Adjustment of
CH1 DC Trigger Level
CH2 DC Trigger Level
CH3 DC Trigger Level
CH4 DC Trigger Level</td><td>VR10
VR19
VR1
VR2</td><td>X73-1500
X73-1500
X73-1520
X73-1520</td><td>DL-720</td><td>HORIZ DISPLAY: A
Vertical MODE: QUAD
CH1, CH2 AC-GND-DC: GND
TRIG MODE: AUTO</td><td>(1) Operate CH1 and CH2 ⇕ POSITION and CH3 and CH4 ⇕ POSITION controls to align the trace with each other on the center of the CRT screen.
(2) Make adjustment so that the voltage at all the check points may be zero (−0.008 ~ +0.008 V).
<table>
<tr><th>Item of Adj</th><th>Adj control</th><th>Check point</th></tr>
<tr><td>CH1 DC Trigger Level</td><td>VR10</td><td>P15 (X73-1500)</td></tr>
<tr><td>CH2 DC Trigger Level</td><td>VR19</td><td>P16 (X73-1500)</td></tr>
<tr><td>CH3 DC Trigger Level</td><td>VR1</td><td>P17 (X73-1520)</td></tr>
<tr><td>CH4 DC Trigger Level</td><td>VR2</td><td>P18 (X73-1520)</td></tr>
</table></td><td>
</td><td><Note>
Use the connector lead for making measurement at the check points.
Adjust the voltage in the conductor to zero.</td></tr>
<tr><td>Adjustment of
V MODE Trigger
DC Level</td><td>VR20</td><td>X73-1500</td><td></td><td>Vertical MODE: CH1
CH1 AC-GND-DC: GND</td><td>(1) Operate CH1 ⇕ POSITION to align the trace with horizontal center graticule line on the CRT screen.
(2) Make adjustment so that the voltage in the conductor of the connector P19 is zero (−0.008 ~ +0.008 V).</td><td></td><td></td></tr>
<tr><td>Adjustment of CH1
OUT Gain</td><td>VR8</td><td>X73-1500</td><td>475A
50Ω Termination
50Ω Coaxial cable
PG-506</td><td>HORIZ DISPLAY: A
Vertical MODE: CH1
TRIG MODE: AUTO
CH1 AC-GND-DC: AC
CH1 VOLTS/DIV: 5mV
CH1 VARIABLE: CAL</td><td>(1) Set the vertical axis sensitivity of oscilloscope (475A) to 50 mV and AC-GND-DC to DC.
(2) Connect the cable to CH1 OUT on the rear panel of CS-2110 and oscilloscope (475A) via the 50Ω termination.
(3) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output and ⇕ POSITION so that the amplitude may be 2 div upward and downward from the horizontal center graticule line on the CRT screen.
(4) Make adjustment so that the oscilloscope (475A) waveform becomes 4 div.</td><td>
VARIABLE−CAL
CS-2110
PG-506
5 mV
CH1
A
AC
a
50Ω coaxial cable
V. MODE
AUTO
1 kHz square wave
VAR→CAL
0.5ms
50 mV
b
50Ω termination
475A

a=b=4 div.</td><td></td></tr>
<tr><td>Adjustment of CH1
OUT DC Level</td><td>VR9</td><td>X73-1500</td><td>DL-720</td><td>HORIZ DISPLAY: A
Vertical MODE: CH1
CH1 AC-GND-DC: GND
TRIG MODE: AUTO</td><td>(1) Operate CH1 ⇕ POSITION to align the trace with the horizontal center graticule line on the CRT screen.
(2) Make adjustment so that the voltage in the connector P21 (X73-1500) becomes less than 0V (±10 mV).</td><td></td><td></td></tr>
<tr><td>Adjustment of Square wave Characteristics of CH3</td><td>VR1
TC1
VR2
TC2
TC8</td><td>X73-1510
X73-1510
X73-1510
X73-1510
X73-1500</td><td>PG-506
50Ω Termination</td><td>HORIZ DISPLAY: A
Vertical MODE: QUAD, ALT
TRIG MODE: AUTO
CH1, CH2 AC-GND-DC: GND
A SOURCE: CH3 1/1
A COUPLING: AC
A SLOPE: +</td><td>(1) With A SOURCE to 1/1 (CH3) apply a 1 MHz square wave signal to CH3 INPUT and adjust the oscillator output to produce a square waveform of 6 div on the CRT screen.
(2) Adjust VR1 and TC1 to shape the square waveform in the medium range.
(3) Adjust VR2 and TC2 to shape the square waveform in the high range.
(4) Adjust TC8 to shape the square waveform in the ultra-high range.
<Check>
<table>
<tr><td>Overshoot</td><td>less than 8%</td></tr>
</table></td><td>
</td><td><Note>
When shaping the waveform, terminate the input terminal of oscilloscope to match the output impedance of the oscillator.</td></tr>
</table>

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of Square wave Characteristics of CH4	TC9	X73-1500	PG-506 50Ω Termination	HORIZ DISPLAY: B DLY'D Vertical MODE: QUAD, ALT TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND B SOURCE: CH4 1/1 B COUPLING: AC B SLOPE: +	Apply a 1 MHz square wave signal to CH4 INPUT and take the same steps as in (4) above to shape the waveform. **<Check>** Overshoot less than 8%		
Adjustment of Square wave Characteristics of CH1 5 mV Range	TC3 TC2	X73-1500 X73-1500	PG-506 50Ω 20dB Attenuator 50Ω Termination 50 Ω Coaxial cable (BNC-BNC)	HORIZ DISPLAY: A TRIG MODE: AUTO CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV A SOURCE: CH1 A COUPLING: AC A SLOPE: + CH1 VARIABLE: CAL	(1) Set vertical MODE to CH1 and repeatedly apply a 1 MHz square wave signal to CH1 INPUT from the square wave oscillator and adjust the oscillator output so that the amplitude becomes 6 div. In doing this, the input terminal must be terminated to match the output impedance of the oscillator. When the output impedance is 50 Ω terminate the 50 Ω termination. (2) Adjust TC3 to shape the square waveform in the high range. (3) Adjust TC2 to shape the square waveform in the ultra-high range. Overshoot less than 3%	 TC2 (X73-1500) (TC6) TC3 (X73-1500) (TC7) 100 90 10 0	(1) Adjust A SWEEP TIME/DIV between 20 ns and 0.2 μs so that the waveform is visible. (2) As all measuring instruments are affected, repeat the adjustment individually.
Adjsutment of Square wave Characteristics of CH2 5 mV Range	TC7 TC6	X73-1500 X73-1500		HORIZ DISPLAY: A TRIG MODE: AUTO CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV A SOURCE: CH2 A COUPLING: AC A SLOPE: + CH2 VARIABLE: CAL	Set vertical MODE to CH2 and make adjustment as in the case of CH1. **<Check>** With VOLTS/DIV remaining at 5 mV, check the waveform quality when A SWEEP TIME/DIV is changed by varying the square wave frequency, from 100 kHz to 10 kHz, 1 kHz and back to 100 Hz sequentially. Overshoot less than 3%	 a=6 div. b=Overshoot c=Ringing d=Hall e=Pre-shoot	
CH1, CH2 Waveform Shaping in the Low Range (10 mV range)	TC1 TC5	X73-1500 X73-1500	PG-506 BNC-BNC cord	HORIZ DISPLAY: A Vertical MODE: CH1 or CH2 TRIG MODE: AUTO A SOURCE: V MODE CH1, CH2 AC-GND-DC: DC CH1, CH2 VOLTS/DIV: 10mV CH1, CH2 VARIABLE: CAL	(1) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 5～6 div. In doing this, make adjustment so that the waveform quality of the 10mV range is equal to that of the 5 mV range. (2) Set vertical MODE to CH2 and make adjustment as in the case of CH1.		

ADJUSTMENT

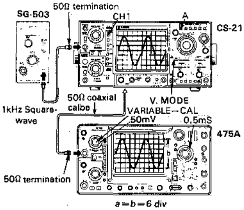
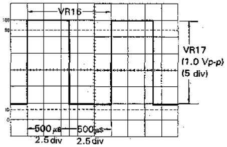
<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B. No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td>Adjustment of CH1 ATT and CH2 ATT</td><td></td><td>S02-4502 -05</td><td>4343B
PG-506</td><td>HORIZ DISPLAY: A
CH1, CH2 AC-GND-DC: DC
A SOURCE: V MODE
A SWEEP TIME/DIV: 0.2 ms
CH1, CH2 VARIABLE: CAL</td><td>(1) Shaping of waveform
Apply a 1 kHz square wave signal to CH1 and CH2 INPUT jacks and adjust the oscillator output to produce a waveform of 5~6 div. In doing this, make adjustment so that the waveform quality of each range is equal to that of the 5 mV range.
(2) Input capacity (22 pF±3 pF)
Connect a Q-meter (4343B) to CH1 and CH2 INPUT jacks and make adjustment so that the input capacity of each range is equal to that of the 5mV range.

CH1 and CH2 Reference range: 5mV Range
<table>
<tr><th>Sequence</th><th colspan="2">Adjustment</th><th>Adj. control</th></tr>
<tr><td>1</td><td>10mV range</td><td>Wave Shape</td><td>TC6</td></tr>
<tr><td>2</td><td>20mV range</td><td>Wave Shape</td><td>TC8</td></tr>
<tr><td>3</td><td>10mV range</td><td>Input Capacity</td><td>TC5</td></tr>
<tr><td>4</td><td>20mV range</td><td>Input Capacity</td><td>TC7</td></tr>
<tr><td>5</td><td>50mV range</td><td>Wave Shape</td><td>TC3</td></tr>
<tr><td>6</td><td>50mV range</td><td>Input Capacity</td><td>TC4</td></tr>
<tr><td>7</td><td>5V range</td><td>Wave Shape</td><td>TC1</td></tr>
<tr><td>8</td><td>5V range</td><td>Input Capacity</td><td>TC2</td></tr>
</table>
</td><td></td><td><Note>
Be sure to make the adjustment with the shield case being fitted in place.</td></tr>
<tr><td>CH3 Waveform Shaping</td><td>TC2
(A SOURCE 1/10)</td><td>X73-1520</td><td>PG-506</td><td>HORIZ DISPLAY: A
Vertical MODE: QUAD, ALT
A SOURCE: CH3 1/1
A SWEEP TIME/DIV: 0.2ms
TRIG MODE: AUTO
CH1, CH2 AC-GND-DC: GND</td><td>(1) Apply a 1 kHz square wave signal of fast rise time to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.
(2) With A SOURCE set to 1/10, produce a waveform of 6 div in the same manner and adjust TC3 to obtain the similar waveform as (1) above.</td><td></td><td></td></tr>
<tr><td>CH4 Waveform Shapping</td><td>TC6
(B SOURCE 1/10)</td><td>X73-1520</td><td></td><td>HORIZ DISPLAY: DUAL
Vertical MODE: QUAD, ALT
A SOURCE: CH3 1/1
B SOURCE: CH4 1/1
A SWEEP TIME/DIV: 0.2ms
B SWEEP TIME/DIV: 0.2ms</td><td>(1) Apply a 1 kHz square wave signal of fast rise time to CH4 INPUT and take the same steps as in (1) above to shape the waveform.</td><td></td><td></td></tr>
<tr><td>Adjustment of CH3 Input Capacity</td><td>TC3 (1/10)</td><td>X73-1520</td><td>4343B</td><td>A SOURCE: CH3 1/1</td><td>(1) Check that the input capacity of CH3 becomes equal to the value of CH1 5mV range (22 pF±3 pF).
(2) Make adjustment so that the input capacity of CH3 setted to 1/10 to become equal to that at 1/1.
<Check>
The difference between A SOURCE 1/1 and A SOURCE 1/10: less than 1pF.
It shall be the same with B SOURCE.</td><td></td><td><Note>
Be sure to make adjustment of input capacity after making 1 kHz square waveshape.</td></tr>
</table>

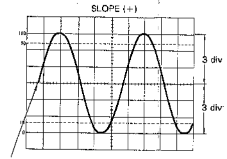
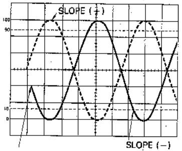
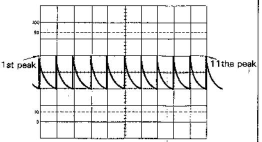
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of CH4 Input Capacity	TC7(1/10)	X73-1520	4343B	B SOURCE: CH4 1/1	Adjust the input capacity in the same manner as CH3. **<Check>** Check the input capacity in the same manner as CH3.		<Note> Be sure to make adjustment of input capacity after making 1 kHz square waveshape.
ADJUSTMENT OF VERTICAL AXIS (II)							
Check of 1 MHz Square wave Characteristics **Square wave Characteristics of CH1 and CH2**			PG-506 50Ω Termination	HORIZ DISPLAY: A A SOURCE: V MODE A SWEEP TIME/DIV: 0.2 μs ~ 20 ns TRIG MODE: AUTO A COUPLING: AC	(1) Check the square wave characteristics of CH1 and CH2 5 mV range. Turn the VOLTS/DIV knob for each channel to adjust the oscillator output so that CH1 and CH2 will produce a waveform of 6 div, respectively. (2) The overshoot must be less than 3% for each range.		<Note> As the VOLTS/DIV is manually rotated, the amplitude of 6 div cannot be obtained amplitude.
Square wave Characteristics of CH3 and CH4				HORIZ DISPLAY: DUAL, ALT Vertical MODE: QUAD, ALT A SOURCE: CH3 1/1 B SOURCE: CH4 1/1	(1) Apply a 1 MHz square wave signal to CH3 and CH4 INPUT jacks and see if the overshoot is less than 8% at this time. (2) The overshoot must be less than 8% when A SOURCE is turned from 1/1 to 1/10 and B SOURCE from 1/1 to 1/10.		
Check of CH1 and CH2 Frequency Characteristics			SG-503 50Ω Coaxial cable (BNC-BNC) 50Ω 20dB Attenuator 50Ω Termination	HORIZ DISPLAY: A TRIG MODE: AUTO A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: DC A SWEEP TIME/DIV: 2μs ~ 20 ns	(1) With CH1 VOLTS/DIV set to 5 mV, apply a sine wave signal of 50 kHz to INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is varied to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div and there must be no sudden dips and peaks during attenuation. (3) Perform the same operations for CH2. Frequency characteristic 100 MHz, less than −3 dB (4) When the specification are not satisfied, readjust the 1 MHz square wave characteristics.		
Adjustment of CH3 and CH4 Frequency Characteristics	TC4 (CH3 1/10) TC8 (CH4 1/10)	X73-1520	SG-503 50Ω Termination 50Ω Coaxial cable (BNC-BNC)	HORIZ DISPLAY: DUAL Vertical MODE: QUAD, ALT TRIG MODE: AUTO A SOURCE: CH3 1/1 B SOURCE: CH4 1/1	(1) Apply a sine wave signal of 50 kHz to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is changed to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div. (3) With A SOURCE to 1/10 position adjust TC4 so that the amplitude at 100 MHz is within the specification limits. Frequency characteristic 100 MHz, less than −3 dB (4) Perform the same operations for CH4. (5) When the specification is not satisfied, readjust the 1 MHz square wave characteristics. (6) Perform the same adjustment for B SOURCE (TC8).		

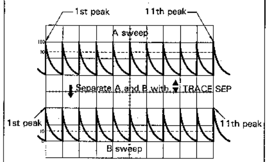
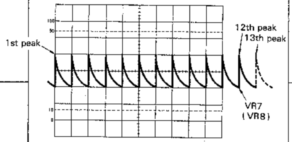
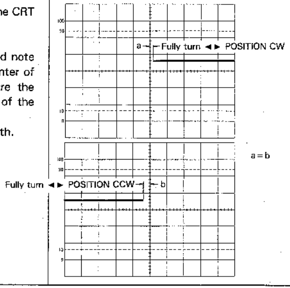
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Check of CH1 and CH2 X5 GAIN Frequency Characteristics			SG-503 50Ω Termination	HORIZ DISPLAY: A A SOURCE: V MODE TRIG MODE: AUTO CH1, CH2 AC-GND-DC: DC CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 X5 GAIN: PULL	(1) With vertical MODE set to CH1, apply a sine wave signal of 50 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is varied to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div. (3) Set vertical MODE to CH2 and make a similar check. X5 GAIN frequency characteristic | 100 MHz, less than −3 dB.		
Check of 20 MHz BW Frequency Characteristics			SG-503 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV 20 MHz BW: ON TRIG MODE: AUTO	(1) Apply a sine wave signal of 50 kHz to CH1 INPUT to produce a waveform of 6 div. (2) Vary the frequency of the input signal without changing to ocsillator output and read the frequency at which the amplitude on the screen becomes 4.25 div. This frequency must be within the specification limits. 20 MHz BW frequency characteristics | frequency of −3dB:15MHz to 25MHz.		
Adjustment of CH1 OUT Frequency Characteristics	TC4	X73-1500	475A 50Ω Termination (through type) 50Ω Coaxial cord (BNC-BNC) SG-503	CH1 AC-GND-DC: AC CH1 VOLTS/DIV: 5mV CH1 ⇕ POSITION: 12 o'clock	(1) With the vertical axis sensitivity of 475A set to 50 mV, lead a 50Ω coaxial cable from CH1 OUT and terminate it with 50Ω termination and connect it to CH1 OUT of 475A. (2) Apply a sine wave signal of 50 kHz to CH1 INPUT and adjust the oscillator output so that the vertical amplitude of 475A becomes 6 div. When the frequency is varied to 100 MHz without changing the oscillator output, adjust TC4 so that the amplitude on the CRT screen of 475A becomes over 4.25 div. CH1 OUT frequency characteristic | 100 MHz, less than −3 dB	 SG-503 50Ω termination CH1 A CS-2110 1kHz Square-wave 50Ω coaxial calbe V. MODE VARIABLE→CAL 50mV 0.5mS 475A 50Ω termination a b a=b=6 div	<Note> If the square wave characteristics of CH1 PRE-AMP and V. OUTPUT AMP are readjusted the square wave characteristic and frequency characteristic will also change.
Adjustment of CAL Output	VR16 VR17	X74-1350 X74-1350	475A FC-756 DL-720		(1) Short-circuit TP1 (X74-1350) and adjust VR17 so that the voltage at CAL output terminal becomes 1.0 V ±1%. (2) Set the vertical axis sensitivity of 475A to 20 mV and the sweep time to 0.2 ms. (3) Lead a probe from the calibration voltage output terminal (CAL) of CS-2110 and connect it to CH1 INPUT of 475A. (4) Adjust VR16 so that the frequency becomes 1 kHz. <Check> Frequency: within 1 kHz ±3%. Output voltage: within 1.0 Vp-p ±1%. Duty ratio: within (50 ±2)%	 VR16 100 90 10 0 VR17 (1.0 Vp-p) (5 div) 500 μs 2.5 div 500 μs 2.5 div	<Note> For checking the frequency, a frequency counter (FC-756) may be used.

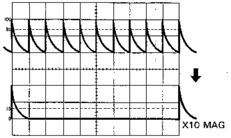
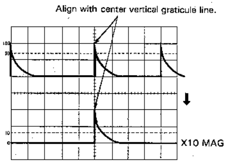
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
ADJUSTMENT OF HORIZONTAL SWEEP							
Coarse Adjustment of A and B Trigger Center and SLOPE **Coarse Adjustment of A Trigger Center and SLOPE**	VR2 VR4	X77-1280 X77-1280	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 0.2ms A SOURCE: V MODE A COUPLING: AC A trigger LEVEL: 12 o'clock A SLOPE: +	(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscilloscope output and ⬍ POSITION to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen. (2) Adjust VR2 so that the starting point of the waveform is aligned with the horizontal center graticule line on the CRT screen. (3) Set A SLOPE to (−) and adjust VR4 to bring the starting point to the position of the starting point of the waveform produced when A SLOPE is set to (+).	 Align the starting point with the horizontal center graticule line  Align SLOPE (−) with the starting point of SLOPE (+)	
Coarse Adjustment of B Trigger Center and SLOPE	VR2 VR3	X77-1290 X77-1290	SG-502	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 B COUPLING: AC B trigger LEVEL: 12 o'clock B SLOPE: + A SWEEP TIME/DIV: 0.5 ms B SWEEP TIME/DIV: 0.2 ms TRIG MODE: AUTO ⬍ TRACE SEP: NORM	(1) Set A INTENSITY to fully CCW. (2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output and ⬍ POSITION to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen. (3) Adjust VR2 so that the starting point of the waveform is aligned with the horizontal center graticule line on the CRT screen. (4) Next, set B SLOPE to (−) and adjust VR3 to bring the starting point of the waveform to the position of the starting point of the waveform produce when B SLOPE is set to (+).		
Adjustment of A Sweep Time	VR9	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A VARIABLE: CAL	(1) Apply a marker signal of 0.5 ms to CH1 INPUT. (2) Operate ◄► POSITION to bring the first peak of the marker signal to the left end of the graticule line and adjust VR9 for the 11th peak to the right end of the graticule line.		**<Note>** (1) When TG-501 is used, set CH1 AC-GND-DC to AC, VOLTS/DIV to 0.5 V/div, thru 50Ω termination. (2) If the 11th peak is not visible, adjust VR7 (X74-1350) for A sweep length adjustment.

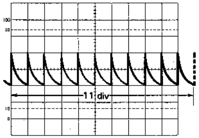
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Time	VR10	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A SWEEP TIME/DIV: 0.5ms B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	(1) Apply a marker signal of 0.5 ms to CH1 INPUT. (2) On the screen A and B sweeps of CH1 input signal will appear. Operate ▲▼ TRACE SEP to bring these sweeps into the positions where they can be easily adjusted. (3) Make adjustment so that the first peak of B sweep is brought to the left end of the graticule line on the screen and the 11th peak to the right end of graticule line on the screen. (4) Make sure that A and B TRIG'D lamps are on.	 1st peak 11th peak A sweep Separate A and B with ▲▼ TRACE SEP 1st peak 11th peak B sweep	<Note> 1. When TG-501 is used, the knobs must be operated in the same manner as described above. 2. If the 11th peak is not visible adjust VR8 (X74-1350) for B sweep length adjustment. 3. The B sweep time will not change even if A VARIABLE is turned.
Adjustment of A Sweep Length	VR7	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO	(1) Apply a marker signal of 0.5 ms to CH1 INPUT. (2) Make adjustment so that the total length is 12 div.		<Note> Turn ◄► POSITION to shift the base line two markers to the left then you can see the 12th time marker with the graticule area.
Adjustment of B Sweep	VR8	X74-1350		HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A SWEEP TIME/DIV: 0.5ms B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	(1) Apply a marker signal of 0.5 ms to CH1 INPUT. (2) A and B sweeps will appear on the screen. Use ▲▼ TRACE SEP to separate them. (3) Make adjustment so that the total length of B sweep is 12 div.		
Adjustment of A Sweep Position	VR11	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO	(1) Set CH1 AC-GND-DC to GND to bring the trace to the center of the CRT screen. (2) Set the FINE knob of ◄► POSITION to 12 o'clock. (3) Turn ◄► POSITION fully CW without turning the FINE knob and note the deviation between the starting point of the trace and the center of the screen. Next, turn ◄► POSITION fully CCW and measure the distance between the ending point of the trace and the center of the screen. Make adjustment so that these deviations will have the same width. Width error less than 1 div.	 a Fully turn ◄► POSITION CW a = b Fully turn ◄► POSITION CCW b	

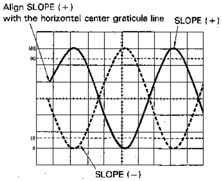
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Position	VR12	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A,B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	(1) Apply a marker signal of 0.5 ms to CH1 INPUT and align the first peak of A sweep to the leftmost division of the CRT screen. (2) Operate ⇕ TRACE SEP to separate A sweep and B sweep and set A VARIABLE to CAL. (3) Make adjustment so that the starting point of B sweep is aligned with that of A sweep in the horizontal position. **<Check>** Operate ⇕ TRACE SEP so that A sweep and B sweep are superimposed on one another and make sure that their starting points coincide with each other.		
Adjustment of X10 MAG Gain	VR13	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.1ms TRIG MODE: AUTO CH1 VOLTS/DIV: 1V CH1 AC-GND-DC: DC	(1) Apply a marker signal of 0.1 ms to CH1 INPUT to produce a waveform of vertical amplitude of about 2 div. (2) Align the first peak of the marker signal with the left end of the graticule line on the CRT screen and the 11th peak with the right end and pull the X10 MAG switch. (3) Make adjustment so that the peak-to-peak distance is 10 div. **<Check>** Specification 10 times ±5%		
Adjustment of X10 MAG Center	VR14	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.1ms A VARIABLE: CAL TRIG MODE: AUTO A SLOPE: +	(1) Apply a marker signal of 0.5 ms to CH1 INPUT to produce 3 peaks waveform on the CRT screen. (2) Operate ◄► POSITION to bring the central peak to the vertical center graticule line on the screen. (3) Make adjustment so that the waveform will be aligned with the vertical center graticule line on the screen when the FINE knob is pulled out (X10 MAG position). **<Check>** Repeatedly push and pull the FINE knob to make sure that the center of the waveform does not move. Deviation less than 1 div.	 Align with center vertical graticule line. 100 90 10 0 X10 MAG	
Adjustment of MAG Center and Gain					Recheck the center at X10 MAG and Gain.		
Adjustment of A Sweep Time, 50ms, 5µs and 0.1µs.	VR2 (50ms) VR1 (5µs) TC1 (0.1µs)	X74-1350 X74-1350 X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE TRIG MODE: AUTO A VARIABLE: CAL	(1) With A SWEEP TIME/DIV set to 50ms apply a marker signal of 50ms to CH1 INPUT. (2) Adjust VR2 so that the first peak of the marker signal is aligned with the left end of the graticule on the screen and the 11th peak with the right end. (3) Next, rotate the A SWEEP TIME/DIV to 5µs and apply a 5µs time marker to CH1 INPUT and adjust VR1 in the same manner as (2). (4) Next, A SWEEP TIME/DIV to 0.1µs and with 0.1µs time marker to CH1 INPUT, adjust TC1 in the same manner as (2).		

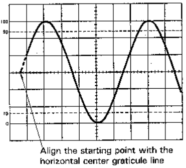
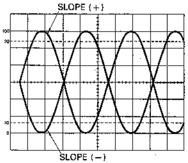
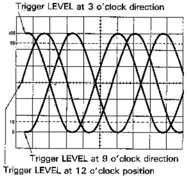
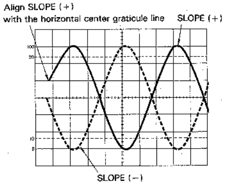
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Time 50ms, 5μs and 0.1μs	VR4 (50ms) VR3 (5μs) TC2 (0.1μs)	X74-1350 X74-1350 X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A,B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	(1) Set A and B SWEEP TIME/DIV to 50ms and apply a marker signal of 50ms to CH1. (2) Operate ⬍ TRACE SEP to separate A sweep and B sweep to be in the positions where adjustment can be made easily. (3) Adjust VR4 so that the first peak of the marker signal is aligned with the left end of the graticule line on the screen and the 11th peak with the right end. (4) Rotate A and B SWEEP TIME/DIV to 5μs and apply a 5μs time marker to CH1 INPUT and adjust VR3 in the same manner as (3). (5) Next, A and B SWEEP TIME/DIV to 0.1μs and with 0.1μs times marker to CH1 INPUT, adjust TC2 in the same manner as (3).		
Adjustment of 20ns A Sweep Linearity	TC3	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 20ns A VARIABLE: CAL TRIG MODE: AUTO A SLOPE: +	(1) Apply a marker signal of 20ns to CH1 INPUT. (2) Make adjustment so that the total length of the waveform is 11 div.		
Adjustment of 20ns B Sweep Linearity	TC4	X74-1350		HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 1.00	(1) With A and B SWEEP TIME/DIV to 20ns, apply a marker signal of 20ns to CH1 INPUT. (2) Operate ⬍ TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted. (3) Make adjustment so that the total length of the waveform is 11 div.		
Check of Sweep Time Error in All the Range [I]				HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE TRIG MODE: AUTO A VARIABLE: CAL	(1) Apply a reference time marker signal for each range of A SWEEP TIME/DIV. (2) Measure the time error rate and make sure it is within the specification limits. Specification | within ±2%.		
[II]				HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A VARIABLE: CAL TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 1.00	(1) Operate ⬍ TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted. (2) Apply a reference time marker signal in each of all the ranges (50ms — 20ns) of B sweep. (3) Measure the time error rate and make sure it is within the specification limits. Specification | within ±2%.		

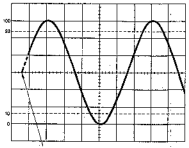
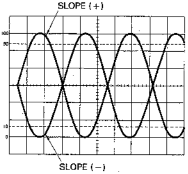
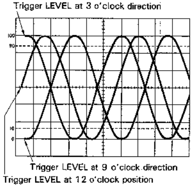
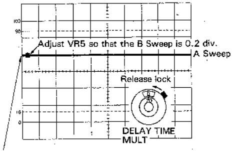
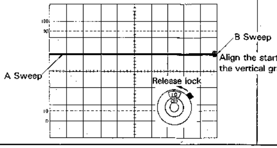
ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
ADJUSTMENT OF X-Y OPERATION							
Adjustment of X Position Center	VR15	X74-1350		HORIZ DISPLAY: A Vertical MODE: DUAL, ALT CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND A SOURCE: CH1 TRIG MODE: AUTO A SWEEP TIME/DIV: 0.1ms	(1) Operate ↕ POSITION for both CH1 and CH2 to superimpose the two traces on one another in the center of the CRT screen. (2) Make adjustment so that the bright spot comes to the center of the screen when HORIZ DISPLAY is switched in X-Y. **<Check>** Operate CH2 ↕ POSITION and make sure that the spot will move as described below. (1) When the knob is turned counterclockwise, the spot moves leftward more than 5 div. (2) When the knob is turned clockwise, the spot moves rightward more than 5 div. Distance between the spot and the center of screen. within ±1 div from the center of the screen.		**<Note>** When making X-Y adjustment, do not set both CH1 and CH2 to X5 GAIN.
Adjustment of X Gain	VR25	X73-1500	PG-506	HORIZ DISPLAY: X-Y CH2 AC-GND-DC: AC CH2 VOLTS/DIV: 5mV	Apply a square wave signal of 20 mVp-p, 1 kHz to CH2 INPUT and make adjustment so that the horizontal amplitude is 4 div.		
Readjustment of X Position Center and X Gain					Readjust X position Center and X Gain.		
Check of X Axis Frequency Characteristic			SG-502	HORIZ DISPLAY: X-Y CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV	(1) Apply a sine wave signal of 1 kHz to CH2 INPUT and adjust the oscillator output to produce a waveform of 10 div. (2) When the frequency is varied to 5 MHz without changing the oscillator output, the amplitude must be over 7.1 div (−3 dB). Frequency characteristic DC to 5 MHz, less than −3 dB.		
ADJUSTMENT OF TRIGGERING							
Adjustment of A Slope	VR4	X77-1280	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A SWEEP TIME/DIV: 0.2ms A SLOPE: + TRIG MODE: AUTO	(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4~6 div on the CRT screen. (2) Operate A trigger LEVEL and CH1 ↕ POSITION so that the waveform may have an amplitude equally above and below the horizontal center graticule line on the CRT screen. (3) Set A SLOPE to (−) and make adjustment so that the starting point of the waveform will be in the position of the starting point of the waveform when A SLOPE is in the (+) position. **<Check>** (1) Repeatedly turn the A SLOPE knob from (+) to (−) and make sure that the starting points are in the same positions. (2) Make sure that the rise slope of the waveform will be synchronized when the A SLOPE knob is in the (+) position and the fall slope will be synchronized when the knob is in the (−) position. (3) Feed the same signal to CH2 and set vertical MODE to CH2 to produce a waveform of CH2 and make sure that the rise slope of the waveform is synchronized when the A SLOPE knob is at (+) and the fall slope is synchronized when it is at (−) position.	 Align SLOPE (+) with the horizontal center graticule line SLOPE (+) 100 90 10 0 SLOPE (−)	

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment A Trigger Level Center and Fix Sensitivity	VR2 VR3	X77-1280 X77-1280	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A SWEEP TIME/DIV: 0.2ms A SOURCE: + TRIG MODE: AUTO	(1) Set A trigger LEVEL to 12 o'clock. (2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen. (3) Operate CH1 ⬍ POSITION to move the waveform so that its amplitude is equally above and below the horizontal center graticule line on the CRT screen. (4) Adjust VR2 so that the starting point of the waveform is on the horizontal center graticule line on the CRT screen. (5) Pull FIX knob and adjust the sine wave input signal of CH1 to obtain a waveform of 1 div. (6) When A SLOPE is alternately turned to (+) and (−), adjust VR3 to synchronize. (7) Repeat (2)～(6) procedures for several times. **<Check>** (1) When A SLOPE is alternately turned to (+) and (−), the starting point must be always on the horizontal center graticule line. (2) With A SLOPE remaining in the position of (+), turn trigger LEVEL clockwise toward 3 o'clock from near 9 o'clock and see if the waveform is as shown at right. (3) Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization can be obtained by A trigger LEVEL.	 100 90 10 0 Align the starting point with the horizontal center graticule line   Trigger LEVEL at 3 o'clock direction 100 90 10 0 Trigger LEVEL at 9 o'clock direction Trigger LEVEL at 12 o'clock position	
Adjustment of 100 MHz Trigger	TC1 TC1	X77-1280 X77-1290	SG-503	A, B SOURCE: CH1	(1) Apply a 100 MHz sine wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 0.8 div on the CRT screen. (2) Adjust TC1 so that the waveform is synchronized at 0.8 div. **<Check>** Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization can't be obtained by trigger LEVEL.		
Adjustment of B Slope	VR3	X77-1290	SG-502	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A, B COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A,B SWEEP TIME/DIV: 0.2ms A VARIABLE: CAL A, B SLOPE: + TRIG MODE: AUTO A, B INTENSITY: Fully CW	(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen. (2) Operate A trigger LEVEL, B trigger LEVEL and CH1 ⬍ POSITION to move waveform so that its amplitude is equally above and below the horizontal center graticule line on the screen. (3) Set A INTENSITY to CCW and B INTENSITY to an arbitrary position near 3 o'clock. (4) Set B SLOPE to (−) and make adjustment so that the starting point of the waveform comes to the same position of the starting point of waveform when B SLOPE is in the (−) position. **<Check>** (1) Turn B SLOPE knob alternately to (+) and (−) and make sure that the starting point is always on the horizontal center graticule line. (2) When B SLOPE is in the (+) position, the rise slope of the waveform should be synchronized and its fall slope be synchronized at (−). (3) Apply the same signal to CH2 and set vertical MODE to CH2 to produce a waveform of B sweep of CH2 on the screen to make sure that the rise slope of the waveform is synchronized when B SLOPE is at (+) and the fall slope is synchronized at (−).	 Align SLOPE (+) with the horizontal center graticule line SLOPE (+) 100 90 10 0 SLOPE (−)	

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Trigger Level Center	VR2	X77-1290	SG-502	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A, B COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A,B SWEEP TIME/DIV: 0.2ms A VARIABLE: CAL B SOURCE: CH1	(1) Turn B trigger LEVEL knob to 12 o'clock. (2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen. (3) Operate CH1 ⬍ POSITION so that the waveform has an amplitude equally above and below the horizontal center graticule line on the screen. (4) Turn A INTENSITY to CCW and B INTENSITY to position near 3 o'clock and make adjustment so that the starting point of the waveform is on the horizontal center graticule line. <Check> (1) Turn B SLOPE alternately to (+) and (−) and make sure that the starting point of the waveform is always on the horizontal center graticule line. (2) With B SLOPE knob remaining in the (+) position, turn trigger LEVEL knob clockwise toward 3 o'clock from near 9 o'clock and see if the waveform appear as shown at right. (3) Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization is obtained at this time by operating B trigger LEVEL.	 Align the starting point with the horizontal center graticule line.   Trigger LEVEL at 3 o'clock direction 100 90 10 0 Trigger LEVEL at 9 o'clock direction Trigger LEVEL at 12 o'clock position	
Adjustment of DELAY TIME MULT	VR5 VR6	X74-1350 X74-1350		HORIZ DISPLAY: ALT Vertical MODE: CH1 CH1 AC-GND-DC: GND TRIG MODE: AUTO A SWEEP TIME/DIV: 0.1ms B SWEEP TIME/DIV: 1μs ⬍ TRACE SEP: NORM STARTS AFTER DELAY: PULL	(1) Set DELAY TIME MULT to 0.20. (2) Operate A INTENSITY and B INTENSITY properly to make B trace brighter and A trace light dimmer. (3) Operate ◄► POSITION to bring the starting point of A trace to the left end of the graticule line on the CRT screen. (4) Make adjustment so that B trace may appear as shown at right. (5) Next, set DELAY TIME MULT to 10.00. (6) Repeat (1) thru (5) 2 or 3 times. <Check> Set DELAY TIME MULT to 5.00 and make sure that the starting point of B trace is in a position within 5 div ±0.2 div from the left end of the screen.	Adjust VR5 so that the B Sweep is 0.2 div. 100 90 A Sweep Release lock 20 10 0 DELAY TIME MULT Align the starting point with the left point of scale.  Align the starting point with the vertical graticule line. (VR6)	

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
OPERATING CHECKS							
Check of Current CAL			Current probe P6302 AM503 475A		Touch a current proble to current CAL terminal on the rear panel to make sure that the calibration current is 1 kHz ±3% and 10 mA ±2%.		
Check of Trigger Sensitivity			SG-502 SG-503 475A	Vertical MODE: CH1 CH1 VOLTS/DIV: 5mV A, B SWEEP TIME/DIV: arbitrary position CH1 AC-GND-DC: AC TRIG MODE: NORM	(1) Make measurements of trigger sensitivity according to the table given next page. (For both A and B sweeps) **[I] A Sweep, INT** (1) Set HORIZ DISPLAY to A and A SOURCE to CH1. (2) Apply a sine wave signal to CH1 INPUT, vary the oscillator output and operate A trigger LEVEL to measure the minimum synchronizing amplitude on the CRT screen. When doing this, make sure that the A TRIG' D lamp is on. Check synchronization by each check frequency. **[II] B Sweep, INT** (1) Set HORIZ DISPLAY to B DLY'D, A SOURCE to CH1 and B SOURCE to CH1. (2) Apply a sine wave to CH1 INPUT, vary the oscillator output and operate B trigger LEVEL to measure the minimum synchronizing amplitude. When doing this, make sure that the A TRIG'D and B TRIG'D lamps are on. Check synchronization by each frequency. **[III] A Sweep, EXT** (1) Set HORIZ DISPLAY to A and A SOURCE to EXT 1/1 or 1/10. (2) Apply a signal of the same voltage simultaneously to CH1 and CH3 INPUT jacks. (3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen. (4) Vary the oscillator output and operate A trigger LEVEL to measure the minimum synchronizing amplitude by the oscilloscope (475A). Check synchronization by each check frequency. When doing this, make sure that A TRIG'D lamp is on. **[IV] B Sweep, EXT** (1) Set HORIZ DISPLAY to ALT, A SOURCE to CH1 and B SOURCE to EXT 1/1 or 1/10. (2) Apply a signal of the same voltage simultaneously to CH1 and CH4 INPUT jacks. (3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen. (4) Operate B trigger LEVEL and A trigger LEVEL to synchronize both A sweep and B sweep. (5) Vary the oscillator output and operate B trigger LEVEL and measure the minimum synchronizing amplitude by the oscilloscope (475A). Check synchronization by each check frequency. (6) Make sure that the B TRIG'D lamp is on.		

ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
					See below		

[V] Check of trigger sensitivity

COUPLING	FREQ. RANGE (Hz)	Trig. sensitivity (Min. sync amplitude)		
		SOURCE V. MODE (CH1 or CH2)	SOURCE EXT 1/1	SOURCE EXT 1/10
AC	20Hz ~ 20MHz ~ 50MHz ~ 100MHz	0.5div 1div 1.5div	50mVp-p 100mVp-p 210mVp-p	0.5Vp-p 1Vp-p 2.1Vp-p
DC	DC ~ 20MHz ~ 50MHz ~ 100MHz	0.5div 1div 1.5div	50mVp-p 100mVp-p 210mVp-p	0.5Vp-p 1Vp-p 2.1Vp-p
AC HF_{REJ}	1kHz 1MHz	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p
AC LF_{REJ}	1MHz 1kHz	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p
VIDEO	VIDEO signal FRAME LINE	0.5div	50mVp-p	0.5Vp-p

[VI] Check of trigger sensitivity by TRIG MODE
HORIZ DISPLAY: A, A SOURCE: AC

TRIG MODE	FREQ. RANGE (Hz)	Trig. sensitivity (Min. sync amplitude)		
		SOURCE V. MODE (CH1 or CH2)	SOURCE EXT 1/1	SOURCE EXT 1/10
AUTO	30Hz ~ 20MHz ~ 50MHz ~ 100MHz	0.5div 1div 1.5div	50mVp-p 100mVp-p 210mVp-p	0.5Vp-p 1Vp-p 2.1Vp-p
FIX	40Hz ~ 20 MHz ~ 80MHz	1.0div 1.5div	100mVp-p 210mVp-p	1.0Vp-p 2.1Vp-p

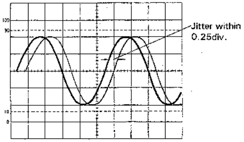
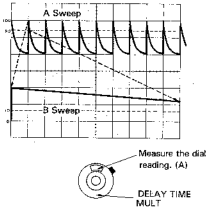
[VII] Check of trigger source (A sweep)

1 TRIG MODE: AUTO, HORIZ DISPLAY: A
2 Applied different signals to CH1 ~ CH4 and operate A SOURCE as described below and make sure to operate as follow.

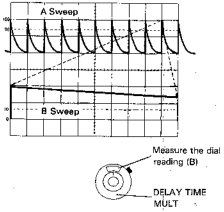
A SOURCE	Operation
V. MODE	Vertical MODE→CH1, The signal of CH1 is synchronized with A sweep Vertical MODE→CH2, The signal of CH2 is synchronized with A sweep Vertical MODE→DUAL, ALT When the signals of CH1 and CH2 are superimposed on one another they are synchronized with the A sweep of CH1 and CH2, respectively, but there will be no synchronization when there is no signal Vertical MODE→DUAL, CHOP, No Sync. Vertical MODE→ADD Synchronized with the signal of CH2 when CH1 + CH2 (CH1 − CH2 at CH2 INV) Vertical MODE→QUAD, ALT When the signals of CH1 ~ CH4 are superimposed on one another on the CRT screen, the signals will be synchronized with the A sweep of CH1 ~ CH4 respectively but there will be no sync when there is no signal. Vertical MODE→QUAD, CHOP, No Sync.
CH1	The signal of CH1 is synchronized with A sweep
CH2	The signal of CH2 is synchronized with A sweep
EXT1/1	The signal of CH3 is synchronized with A sweep
EXT 1/10	The signal of CH3 is attenuated to 1/10 and synchronized with A sweep.

3 Check sync by the lighting of A TRIG'D lamp.

ADJUSTMENT

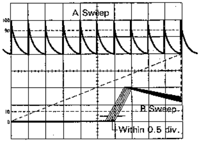
<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B. No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>[VIII] Check of trigger source (B sweep)
(1) Set HORIZ DISPLAY to A, TRIG MODE to AUTO, Vertical MODE to DUAL, ALT and A SOURCE to V MODE.
(2) Apply different signals to CH1, CH2 and CH4 and superimpose the signals of CH1 and CH2 on one another on the CRT screen and synchronize them by A trigger LEVEL.
(3) Set HORIZ DISPLAY to B DLY'D and operate B SOURCE as described below to check the synchronization.
<table>
<tr><th>B SOURCE</th><th>Operation</th></tr>
<tr><td>CH1</td><td>The signal of CH1 is synchronized with B sweep.</td></tr>
<tr><td>CH2</td><td>The signal of CH2 is synchronized with B sweep.</td></tr>
<tr><td>EXT 1/1</td><td>The signal of CH4 is synchronized with B sweep.</td></tr>
<tr><td>EXT 1/10</td><td>The signal of CH4 is attenuated to 1/10 and synchronized with B sweep.</td></tr>
</table>
(4) Make sure that the B TRIG'D lamp is on.</td><td></td><td></td></tr>
<tr><td>Check of Jitter</td><td></td><td></td><td>SG503
50Ω Termination</td><td>HORIZ DISPLAY: A
A SOURCE: CH1
TRIG MODE: NORM
A COUPLING: AC
A SWEEP TIME/DIV: 20ns
CH1 VOLTS/DIV: 0.1V
CH1 AC-GND-DC: AC
X10 MAG: PULL
HOLDOFF: NORM</td><td>(1) Apply a sine wave signal of 100 MHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4 div on the CRT screen.
(2) Operate A trigger LEVEL to find a point where the jitter is minimized.
<table>
<tr><td>Jitter</td><td>less than 0.25 div</td></tr>
</table></td><td>
</td><td></td></tr>
<tr><td>Check of DELAY TIME MULT</td><td></td><td></td><td>TG-501
50Ω Termination</td><td>HORIZ DISPLAY: ALT
A, B SOURCE: CH1
TRIG MODE: AUTO
Vertical MODE: CH1
STARTS AFTER DELAY: PULL
CH1 AC-GND-DC: AC
A SWEEP TIME/DIV: 1ms
B SWEEP TIME/DIV: 5μs</td><td>(1) Apply a marker signal of 1 ms to CH1 INPUT to produce a waveform of 2~3 div on the CRT screen.
(2) Operate ↕ TRACE SEP to separate B sweep and A sweep.
(3) Operate ◄► POSITION to align the first peak of the waveform with the left end of the screen.
(4) Adjust A INTENSITY and B INTENSITY to bring the waveform into the positions where they can be easily visible.
(5) Operate DELAY TIME MULT so that the patterns of the screen appear as shown at right (the second peak of the A sweep should be intensity modulated and should be aligned with the left end of B sweep scale) and note the dial reading at this time.</td><td>
</td><td><Note>
When TG-501 is used, CH1 VOLTS/DIV should be set to 0.5V thru 50Ω termination.</td></tr>
</table>

ADJUSTMENT

<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B. No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>(6) Turn DELAY TIME MULT and operate ◄► POSITION so that what is shown at right will happen at the 10th peak and note the dial reading at this time.
(7) Make the following calculation from the dial reading to make sure that the error is within the specification limits.
(B) − (A) = 8.00 ± 0.2<table><tr><td>Time multiplication error</td><td>within ±(1% of measurement +0.1% of full scale)</td></tr></table></td><td>

A Sweep
100
90
10
0
B Sweep
Measure the dial reading (B)
DELAY TIME MULT

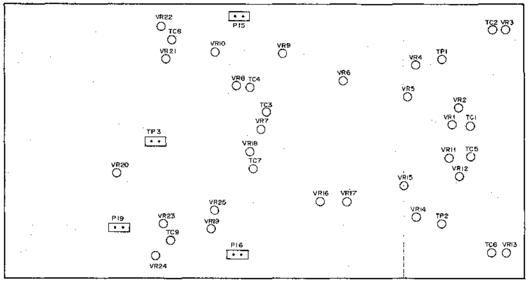
</td><td></td></tr>
<tr><td>Check of Delay Time Jitter</td><td></td><td></td><td>TG-501
50Ω Termination</td><td>HORIZ DISPLAY: ALT
A SOURCE: CH1
B SOURCE: CH2
TRIG MODE: AUTO
Vertical MODE: CH1
STARTS AFTER DELAY: PULL

B ENDS A: ON
CH1 AC-GND-DC: AC
A SWEEP TIME/DIV: 1ms
B SWEEP TIME/DIV: 1μs</td><td>(1) Apply a marker signal of 1 ms to CH1 INPUT to produce a waveform of 2 ~ 3 div on the CRT screen.
(2) Operate ⬍ TRACE SEP to separate A sweep and B sweep.
(3) Operate DELAY TIME MULT to obtain the patterns as shown at right. (DELAY TIME MULT is to be set to about 10.00).
(4) Make sure that the jitter of B sweep is less than 0.5 div at this time.<table><tr><td>Specification</td><td>less than 1/20,000</td></tr></table></td><td>

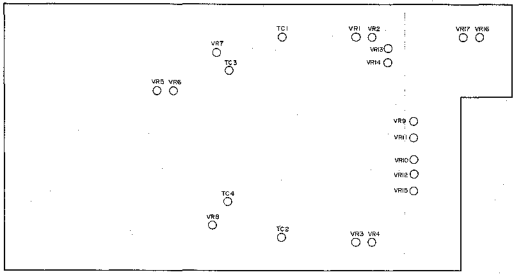
A Sweep
100
90
10
0
B Sweep
Within 0.5 div.

</td><td></td></tr>
<tr><td>Check of BEAM FIND</td><td></td><td></td><td></td><td>HORIZ DISPLAY: ALT
A SOURCE: CH1
B SOURCE: CH2
TRIG MODE: AUTO
Vertical MODE: CH1
STARTS AFTER DELAY: PULL
B ENDS A: ON
CH1 AC-GND-DC: AC
A SWEEP TIME/DIV: 1ms
B SWEEP TIME/DIV: 1μs</td><td>Make sure that the trace length is fully covered the screen when rotated SWEEP TIME/DIV to each range:</td><td></td><td></td></tr>
</table>

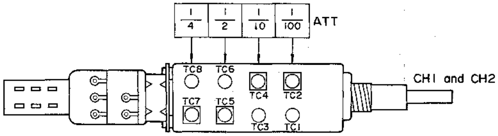
X73-1500-00 (VERTICAL PREAMP UNIT)


VR22
TC8
P15
VR10
VR9
TC2
VR3
VR21
VR4
TP1
VR8
TC4
VR6
VR5
TC3
VR2
VR7
VR1
TC1
TP3
VR18
VR11
TC5
TC7
VR12
VR20
VR15
VR16
VR17
VR25
VR14
TP2
P19
VR23
VR19
TC9
P16
TC6
VR13
VR24

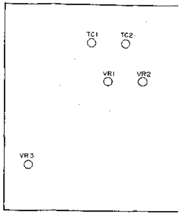
X74-1350-00 (TRIG SWEEP UNIT)


TC1
VR1
VR2
VR17
VR16
VR7
VR13
VR14
TC3
VR5
VR6
VR9
VR11
VR10
VR12
VR15
TC4
VR8
TC2
VR3
VR4

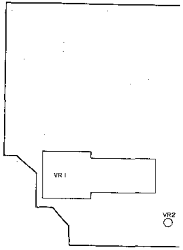
VERTICAL ATT.


1/4
1/2
1/10
1/100
ATT
TC8
TC6
TC4
TC2
TC7
TC5
TC3
TC1
CH1 and CH2

X73-1510-00 (VERTICAL


TC1
TC2
VR1
VR2
VR3

X77-1280-00 (A TRIG SW



X68-1400-00 (POWER BL

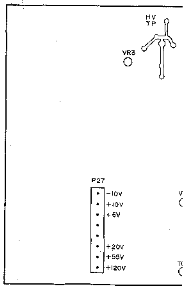
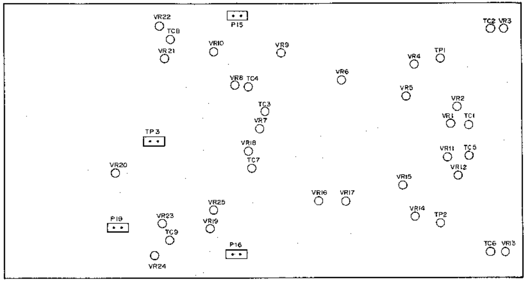

HV TP
VR3
P27
-10V
+10V
+5V
+20V
+55V
+120V

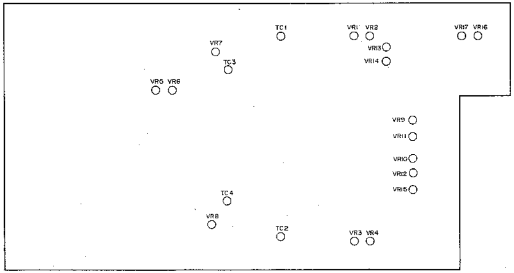
Fig. 6 LOCATIO

ADJUSTMENT

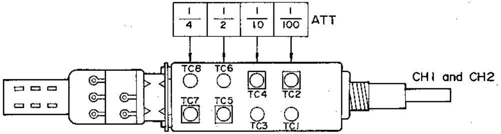
X73-1500-00 (VERTICAL PREAMP UNIT)


VR22
TC8
P15
TC2 VR3
VR21
VR10
VR9
VR4
TP1
VR8 TC4
VR6
VR5
VR2
TC3
VR1
TC1
VR7
TP3
VR18
VR11
TC5
TC7
VR12
VR20
VR15
VR16
VR17
VR25
VR14
TP2
P19
VR23
VR19
TC9
P16
TC6 VR13
VR24

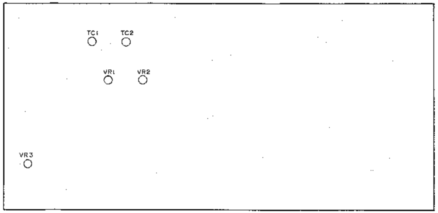
X74-1350-00 (TRIG SWEEP UNIT)


TC1
VR1 VR2
VR17 VR16
VR7
VR13
VR14
TC3
VR5 VR6
VR9
VR11
VR10
VR12
VR15
TC4
VR8
TC2
VR3 VR4

VERTICAL ATT.

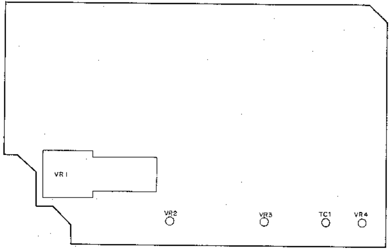

1/4
1/2
1/10
1/100
ATT
TC8
TC6
TC4
TC2
TC7
TC5
TC3
TC1
CH1 and CH2

X73-1510-00 (VERTICAL OUTPUT AMP UNIT)

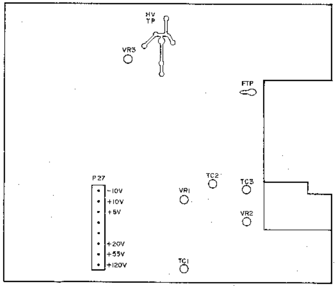

TC1
TC2
VR1
VR2
VR3

(Component side view)

X77-1280-00 (A TRIG SWITCH UNIT)

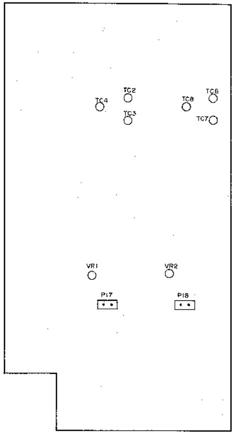

VR1
VR2
VR3
TC1
VR4

X68-1400-00 (POWER BLANKING UNIT)


HV TP
VR3
FTP
P27
-10V
+10V
+5V
+20V
+55V
+120V
TC2
TC3
VR1
VR2
TC1

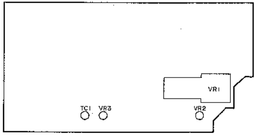
(Component side view)

X73-1520-00 (CH3, CH4 AMP UNIT)


TC2
TC4
TC3
TC8
TC6
TC7
VR1
VR2
P17
P18

(Component side view)

X77-1290-00 (B TRIG SWITCH UNIT)


VR1
TC1
VR3
VR2

X81-1430-00 (ASTIG UNIT)

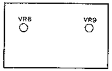
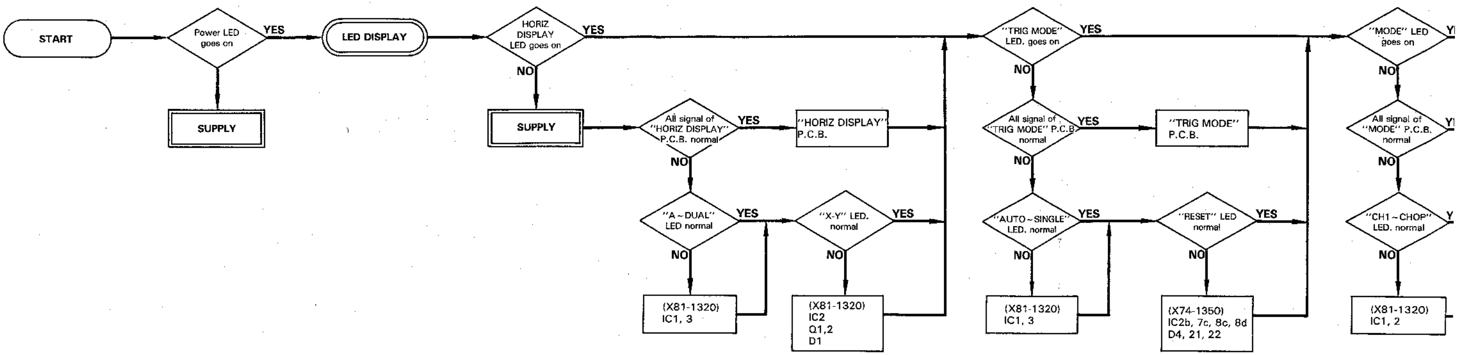
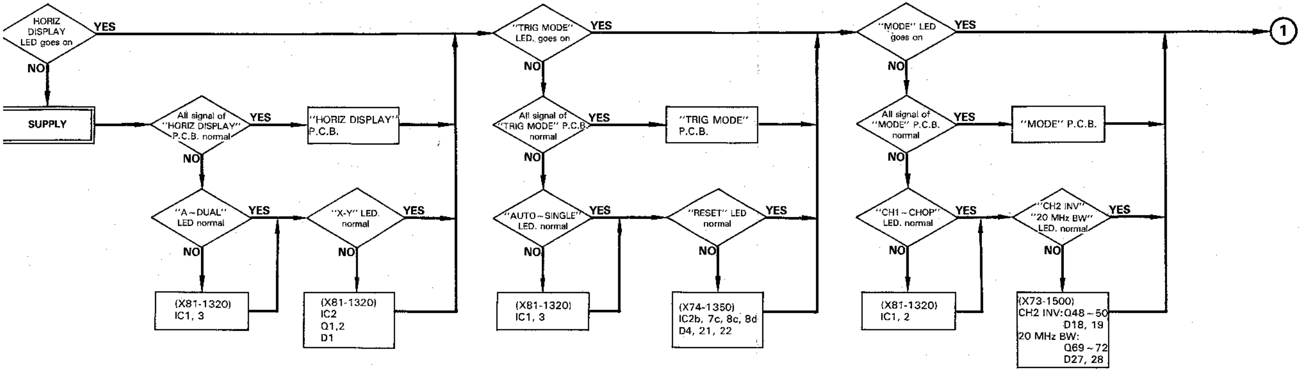


Fig. 6 LOCATION OF ADJ. CONTROLS

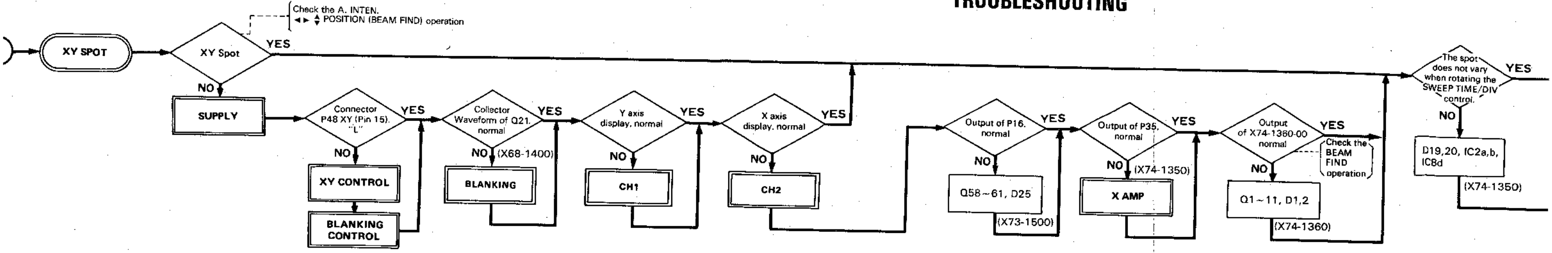
TROUBLESHOOTING

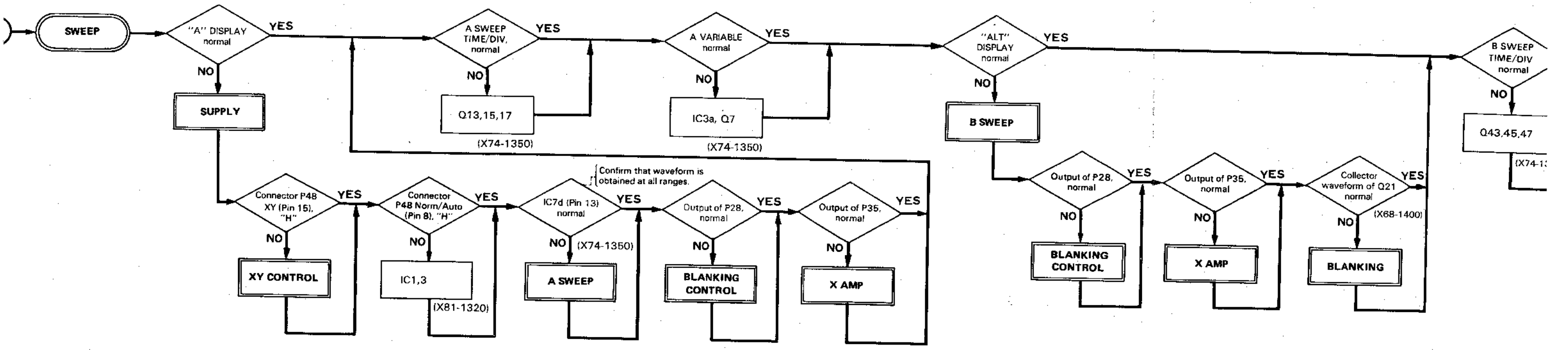

START
Power LED goes on
YES
SUPPLY
LED DISPLAY
HORIZ DISPLAY LED goes on
YES
NO
SUPPLY
All signal of "HORIZ DISPLAY" P.C.B. normal
YES
"HORIZ DISPLAY" P.C.B.
NO
"A ~ DUAL" LED normal
YES
NO
(X81-1320) IC1, 3
"X-Y" LED. normal
YES
NO
(X81-1320) IC2 Q1,2 D1
"TRIG MODE" LED. goes on
YES
NO
All signal of "TRIG MODE" P.C.B. normal
YES
"TRIG MODE" P.C.B.
NO
"AUTO ~ SINGLE" LED. normal
YES
NO
(X81-1320) IC1, 3
"RESET" LED normal
YES
NO
(X74-1350) IC2b, 7c, 8c, 8d D4, 21, 22
"MODE" LED goes on
NO
All signal of "MODE" P.C.B. normal
NO
"CH1 ~ CHOP" LED. normal
NO
(X81-1320) IC1, 2

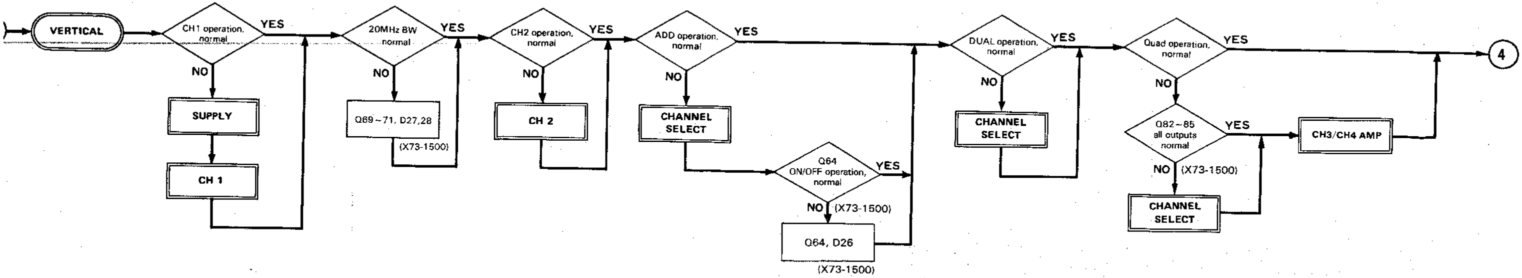
TROUBLESHOOTING


HORIZ DISPLAY LED goes on
YES
NO
SUPPLY
All signal of "HORIZ DISPLAY" P.C.B. normal
YES
NO
"HORIZ DISPLAY" P.C.B.
"A ~ DUAL" LED normal
YES
NO
(X81-1320) IC1, 3
"X-Y" LED. normal
YES
NO
(X81-1320) IC2 Q1,2 D1
"TRIG MODE" LED. goes on
YES
NO
All signal of "TRIG MODE" P.C.B. normal
YES
NO
"TRIG MODE" P.C.B.
"AUTO ~ SINGLE" LED. normal
YES
NO
(X81-1320) IC1, 3
"RESET" LED normal
YES
NO
(X74-1350) IC2b, 7c, 8c, 8d D4, 21, 22
"MODE" LED goes on
YES
NO
All signal of "MODE" P.C.B. normal
YES
NO
"MODE" P.C.B.
"CH1 ~ CHOP" LED. normal
YES
NO
(X81-1320) IC1, 2
"CH2 INV" "20 MHz BW" LED. normal
YES
NO
(X73-1500) CH2 INV:Q48 ~ 50 D18, 19 20 MHz BW: Q69 ~ 72 D27, 28
①

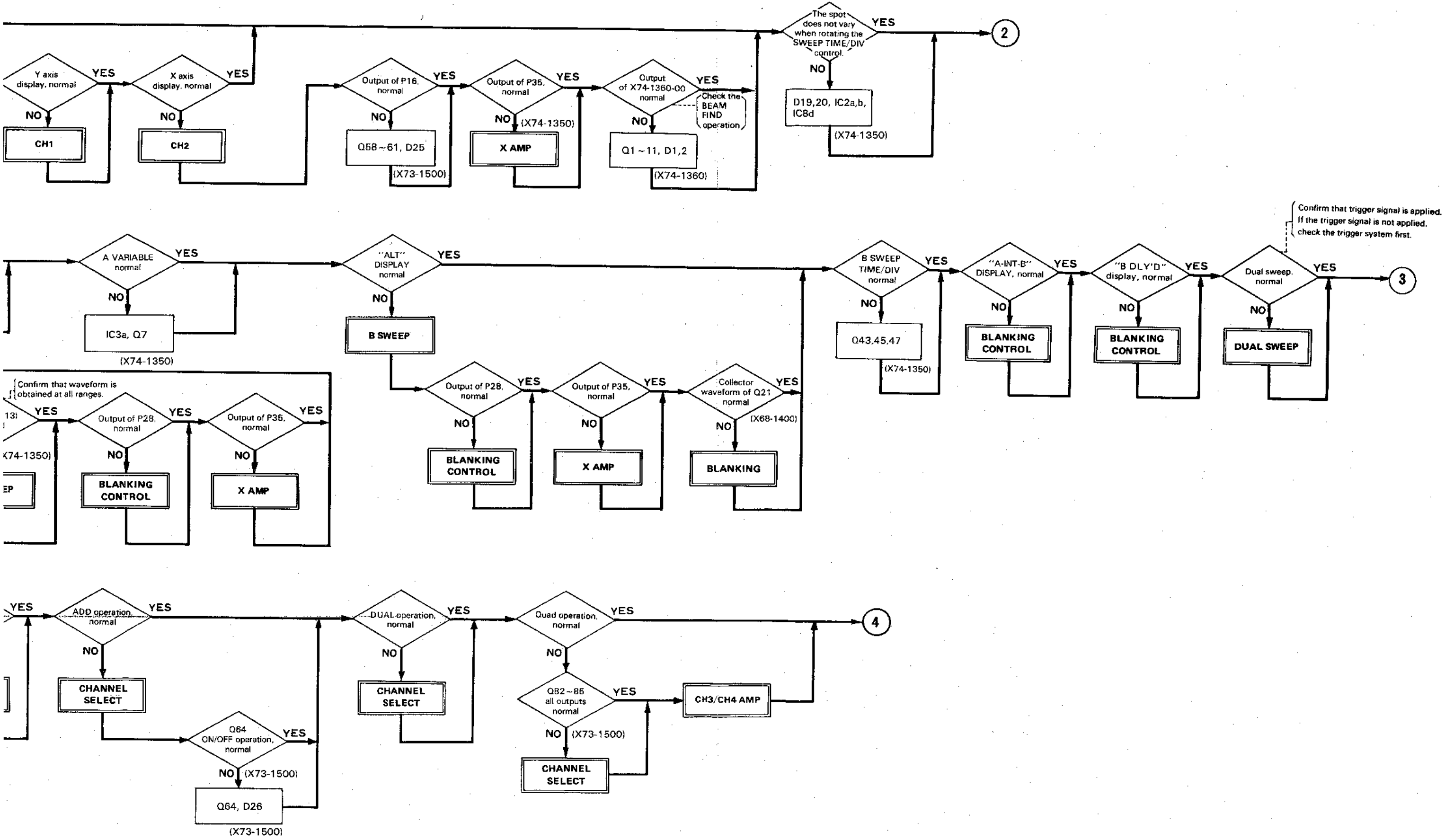
TROUBLESHOOTING

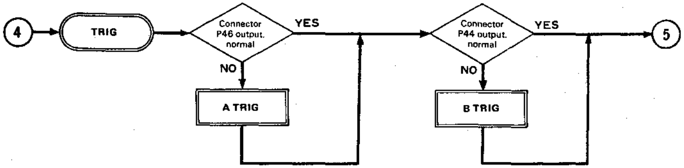

XY SPOT
Check the A. INTEN.
◄► ▲▼ POSITION (BEAM FIND) operation
XY Spot
YES
NO
SUPPLY
Connector P48 XY (Pin 15). "L"
NO
XY CONTROL
BLANKING CONTROL
YES
Collector Waveform of Q21. normal
NO
(X68-1400)
BLANKING
YES
Y axis display, normal
NO
CH1
YES
X axis display, normal
NO
CH2
YES
Output of P16. normal
NO
Q58～61, D25
(X73-1500)
YES
Output of P35, normal
NO
(X74-1350)
X AMP
YES
Output of X74-1360-00 normal
Check the BEAM FIND operation
NO
Q1～11, D1,2
(X74-1360)
YES
The spot does not vary when rotating the SWEEP TIME/DIV control.
YES
NO
D19,20, IC2a,b, IC8d
(X74-1350)

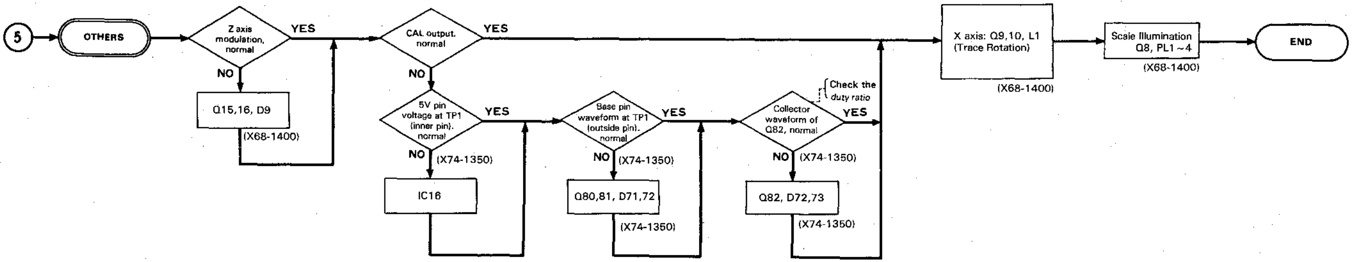

SWEEP
"A" DISPLAY normal
YES
NO
SUPPLY
A SWEEP TIME/DIV, normal
YES
NO
Q13,15,17
(X74-1350)
A VARIABLE normal
YES
NO
IC3a, Q7
(X74-1350)
"ALT" DISPLAY normal
YES
NO
B SWEEP
B SWEEP TIME/DIV normal
NO
Q43,45,47
(X74-1
Connector P48 XY (Pin 15), "H"
YES
NO
XY CONTROL
Connector P48 Norm/Auto (Pin 8), "H"
YES
NO
IC1,3
(X81-1320)
Confirm that waveform is obtained at all ranges.
IC7d (Pin 13) normal
YES
NO
(X74-1350)
A SWEEP
Output of P28, normal
YES
NO
BLANKING CONTROL
Output of P35, normal
YES
NO
X AMP
Output of P28, normal
YES
NO
BLANKING CONTROL
Output of P35, normal
YES
NO
X AMP
Collector waveform of Q21 normal
YES
NO
(X68-1400)
BLANKING


VERTICAL
CH1 operation, normal
YES
NO
SUPPLY
CH 1
20MHz BW normal
YES
NO
Q69～71, D27,28
(X73-1500)
CH2 operation, normal
YES
NO
CH 2
ADD operation, normal
YES
NO
CHANNEL SELECT
Q64 ON/OFF operation, normal
YES
NO
(X73-1500)
Q64, D26
(X73-1500)
DUAL operation, normal
YES
NO
CHANNEL SELECT
Quad operation, normal
YES
NO
Q82～85 all outputs normal
YES
NO
(X73-1500)
CHANNEL SELECT
CH3/CH4 AMP
4

TROUBLESHOOTING

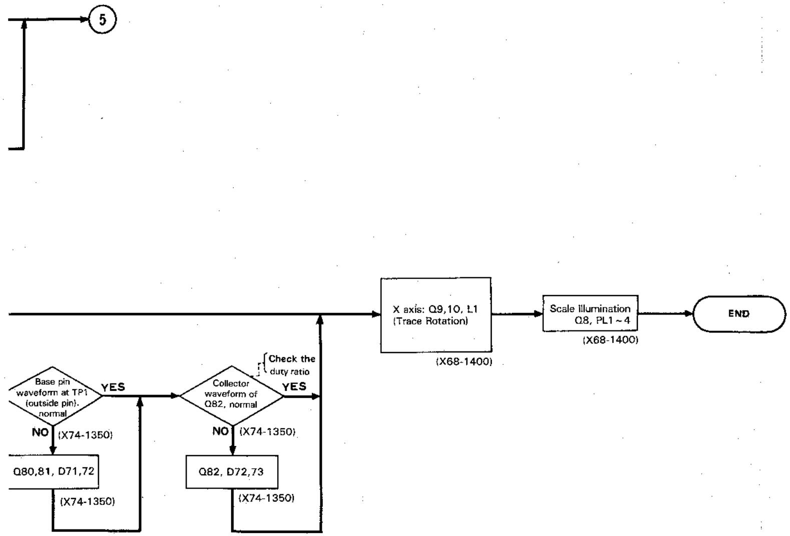

Y axis display, normal
YES
NO
CH1
X axis display, normal
YES
NO
CH2
Output of P16, normal
YES
NO
Q58～61, D25
(X73-1500)
Output of P35, normal
YES
NO
(X74-1350)
X AMP
Output of X74-1360-00 normal
YES
NO
Check the BEAM FIND operation
Q1～11, D1,2
(X74-1360)
The spot does not vary when rotating the SWEEP TIME/DIV control.
YES
NO
D19,20, IC2a,b, IC8d
(X74-1350)
2
A VARIABLE normal
YES
NO
IC3a, Q7
(X74-1350)
"ALT" DISPLAY normal
YES
NO
B SWEEP
Output of P28, normal
YES
NO
BLANKING CONTROL
Output of P35, normal
YES
NO
X AMP
Collector waveform of Q21 normal
YES
NO
(X68-1400)
BLANKING
B SWEEP TIME/DIV normal
YES
NO
Q43,45,47
(X74-1350)
"A-INT-B" DISPLAY, normal
YES
NO
BLANKING CONTROL
"B DLY'D" display, normal
YES
NO
BLANKING CONTROL
Dual sweep, normal
YES
NO
DUAL SWEEP
Confirm that trigger signal is applied. If the trigger signal is not applied, check the trigger system first.
3
Confirm that waveform is obtained at all ranges.
13)
YES
(X74-1350)
EP
Output of P28, normal
YES
NO
BLANKING CONTROL
Output of P35, normal
YES
NO
X AMP
YES
ADD operation, normal
YES
NO
CHANNEL SELECT
Q64 ON/OFF operation, normal
YES
NO
(X73-1500)
Q64, D26
(X73-1500)
DUAL operation, normal
YES
NO
CHANNEL SELECT
Quad operation, normal
YES
NO
Q82～85 all outputs normal
YES
NO
(X73-1500)
CH3/CH4 AMP
CHANNEL SELECT
4


4
TRIG
Connector P46 output, normal
YES
NO
A TRIG
Connector P44 output, normal
YES
NO
B TRIG
5


5
OTHERS
Z axis modulation, normal
YES
NO
Q15,16, D9
(X68-1400)
CAL output, normal
YES
NO
5V pin voltage at TP1 (inner pin), normal
YES
NO
(X74-1350)
IC16
Base pin waveform at TP1 (outside pin), normal
YES
NO
(X74-1350)
Q80,81, D71,72
(X74-1350)
Check the duty ratio
Collector waveform of Q82, normal
YES
NO
(X74-1350)
Q82, D72,73
(X74-1350)
X axis: Q9,10, L1 (Trace Rotation)
(X68-1400)
Scale Illumination Q8, PL1 ~ 4
(X68-1400)
END

Q8
Bas
Q8
Collect
Q8
Bas
(TP
Q8
Collect
Q8
Ba
Q8
Collect
Fig

TROUBLESHOOTING


5
Base pin waveform at TP1 (outside pin). normal
YES
NO
(X74-1350)
Q80,81, D71,72
(X74-1350)
Collector waveform of Q82, normal
Check the duty ratio
YES
NO
(X74-1350)
Q82, D72,73
(X74-1350)
X axis: Q9,10, L1 (Trace Rotation)
(X68-1400)
Scale Illumination Q8, PL1 ~ 4
(X68-1400)
END

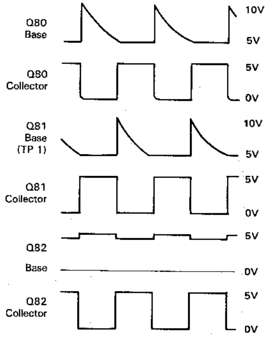
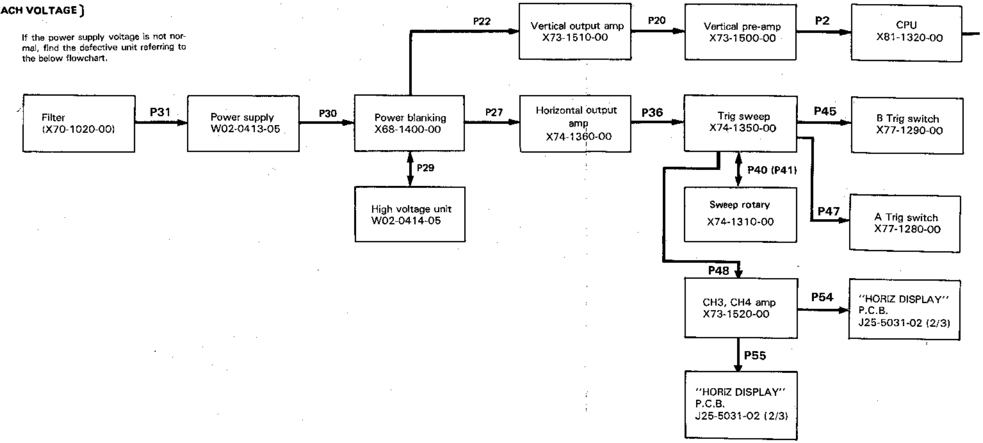

Q80 Base
10V
5V
Q80 Collector
5V
0V
Q81 Base (TP 1)
10V
5V
Q81 Collector
5V
0V
Q82 Base
5V
0V
Q82 Collector
5V
0V

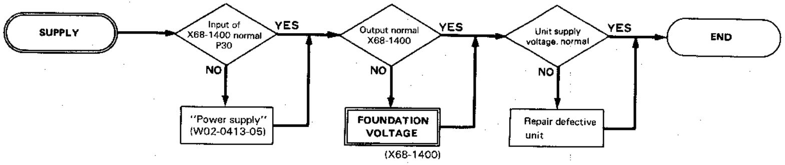
Fig. 7 CAL CIRCUIT WAVEFORMS

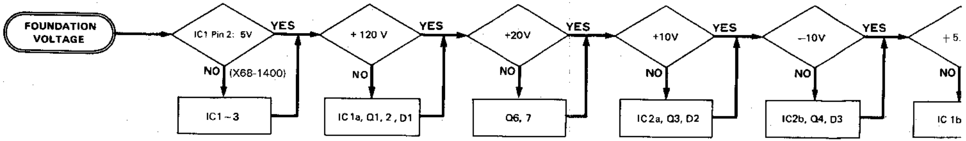
TROUBLESHOOTING

(POWER SUPPLY OF EACH VOLTAGE)

If the power supply voltage is not normal, find the defective unit referring to the below flowchart.


Filter
(X70-1020-00)
P31
Power supply
W02-0413-05
P30
Power blanking
X68-1400-00
P29
High voltage unit
W02-0414-05
P22
Vertical output amp
X73-1510-00
P20
Vertical pre-amp
X73-1500-00
P2
CPU
X81-1320-00
P27
Horizontal output amp
X74-1360-00
P36
Trig sweep
X74-1350-00
P45
B Trig switch
X77-1290-00
P40 (P41)
Sweep rotary
X74-1310-00
P47
A Trig switch
X77-1280-00
P48
CH3, CH4 amp
X73-1520-00
P54
"HORIZ DISPLAY" P.C.B.
J25-5031-02 (2/3)
P55
"HORIZ DISPLAY" P.C.B.
J25-5031-02 (2/3)

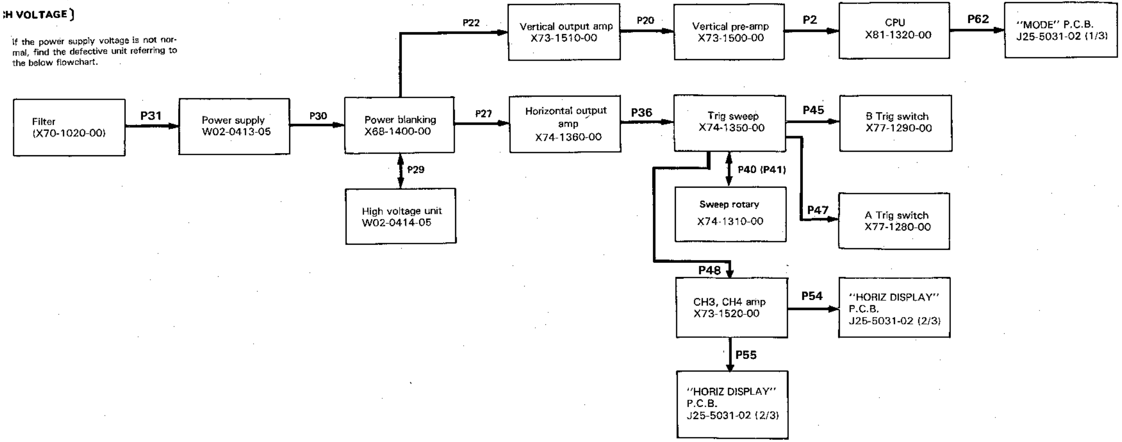

SUPPLY
Input of X68-1400 normal P30
YES
NO
"Power supply" (W02-0413-05)
Output normal X68-1400
YES
NO
FOUNDATION VOLTAGE
(X68-1400)
Unit supply voltage. normal
YES
NO
Repair defective unit
END

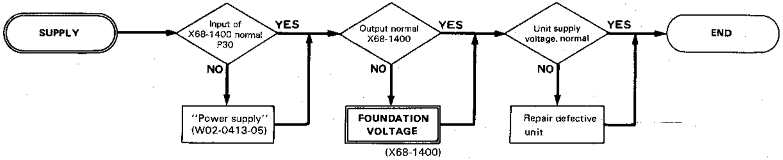

FOUNDATION VOLTAGE
IC1 Pin 2: 5V
YES
NO
(X68-1400)
IC1 ~ 3
+ 120 V
YES
NO
IC 1a, Q1, 2, D1
+20V
YES
NO
Q6, 7
+10V
YES
NO
IC 2a, Q3, D2
–10V
YES
NO
IC2b, Q4, D3
+ 5.
NO
IC 1b

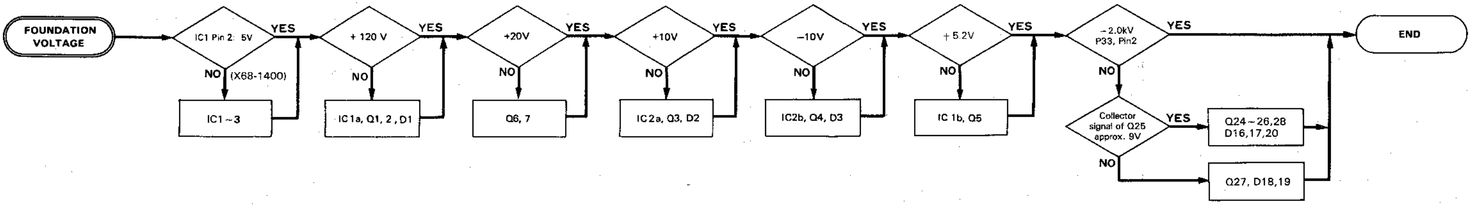
TROUBLESHOOTING

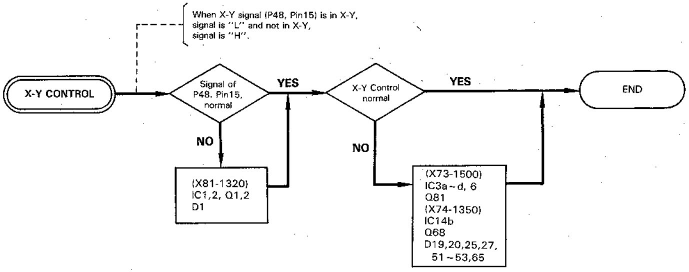
:H VOLTAGE)

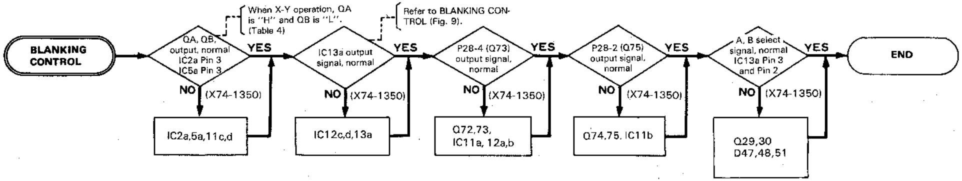
If the power supply voltage is not normal, find the defective unit referring to the below flowchart.

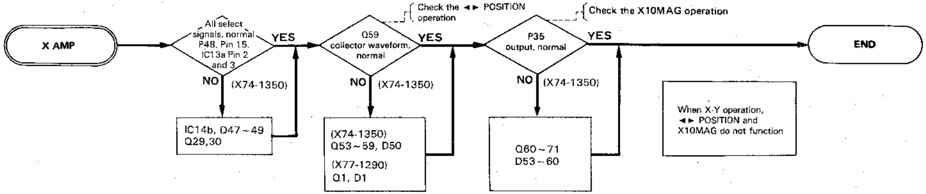

Filter
(X70-1020-00)
P31
Power supply
W02-0413-05
P30
Power blanking
X68-1400-00
P29
High voltage unit
W02-0414-05
P22
Vertical output amp
X73-1510-00
P20
Vertical pre-amp
X73-1500-00
P2
CPU
X81-1320-00
P62
"MODE" P.C.B.
J25-5031-02 (1/3)
P27
Horizontal output amp
X74-1360-00
P36
Trig sweep
X74-1350-00
P45
B Trig switch
X77-1290-00
P40 (P41)
Sweep rotary
X74-1310-00
P47
A Trig switch
X77-1280-00
P48
CH3, CH4 amp
X73-1520-00
P54
"HORIZ DISPLAY" P.C.B.
J25-5031-02 (2/3)
P55
"HORIZ DISPLAY" P.C.B.
J25-5031-02 (2/3)


SUPPLY
Input of X68-1400 normal P30
YES
NO
"Power supply" (W02-0413-05)
Output normal X68-1400
YES
NO
FOUNDATION VOLTAGE
(X68-1400)
Unit supply voltage, normal
YES
NO
Repair defective unit
END

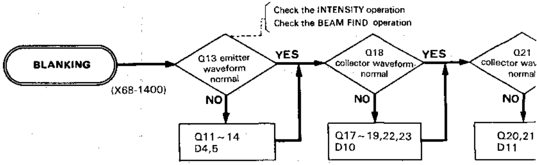

FOUNDATION VOLTAGE
IC1 Pin 2: 5V
YES
NO
(X68-1400)
IC1 ~ 3
+ 120 V
YES
NO
IC1a, Q1, 2, D1
+20V
YES
NO
Q6, 7
+10V
YES
NO
IC2a, Q3, D2
−10V
YES
NO
IC2b, Q4, D3
+ 5.2V
YES
NO
IC 1b, Q5
− 2.0kV P33, Pin2
YES
NO
Collector signal of Q25 approx. 9V
YES
Q24 ~ 26,28 D16,17,20
NO
Q27, D18,19
END


When X-Y signal (P48, Pin15) is in X-Y, signal is "L" and not in X-Y, signal is "H".
X-Y CONTROL
Signal of P48. Pin15, normal
YES
NO
(X81-1320) IC1,2, Q1,2 D1
X-Y Control normal
YES
NO
(X73-1500) IC3a～d, 6 Q81 (X74-1350) IC14b Q68 D19,20,25,27, 51～53,65
END


When X-Y operation, QA is "H" and QB is "L". (Table 4)
Refer to BLANKING CONTROL (Fig. 9).
BLANKING CONTROL
QA, QB, output, normal IC2a Pin 3 IC5a Pin 3
YES
NO
(X74-1350)
IC2a,5a,11c,d
IC13a output signal, normal
YES
NO
(X74-1350)
IC12c,d,13a
P28-4 (Q73) output signal, normal
YES
NO
(X74-1350)
Q72,73, IC11a, 12a,b
P28-2 (Q75) output signal, normal
YES
NO
(X74-1350)
Q74,75, IC11b
A, B select signal, normal IC13a Pin 3 and Pin 2
YES
NO
(X74-1350)
Q29,30 D47,48,51
END


Check the ◄► POSITION operation
Check the X10MAG operation
X AMP
All select signals, normal P48, Pin 15, IC13a Pin 2 and 3
YES
NO
(X74-1350)
IC14b, D47～49 Q29,30
Q59 collector waveform, normal
YES
NO
(X74-1350)
(X74-1350) Q53～59, D50 (X77-1290) Q1, D1
P35 output, normal
YES
NO
(X74-1350)
Q60～71 D53～60
END
When X-Y operation, ◄► POSITION and X10MAG do not function

TROUBLESHOOTING


Check the INTENSITY operation
Check the BEAM FIND operation
BLANKING
(X68-1400)
Q13 emitter waveform normal
YES
NO
Q11～14 D4,5
Q18 collector waveform normal
YES
NO
Q17～19,22,23 D10
Q21 collector wav normal
NO
Q20,21 D11

BLANKING CONTROL

HORIZ DISPLAY	P48 X-Y BUFFER 15Pin	IC13a				IC12d OUT	P28	
		IN		OUT			A. blanking 4 Pin	B. blanking 2 Pin
		S	R	Q	$\overline{Q}$			
A	H	H	L	H	L	H	QA	H
ALT	H	L	L	TOGGLE		H	QA*	QB
A-INT-B	H	H	L	H	L	H	QA	QB
B-DLY'D	H	L	H	L	H	H	H	QB
DUAL	H	L	L	TOGGLE		TOGGLE	QA*	QB*
X-Y	L	H	L	H	L	H	L	H

Complex waveform IC11b output. When CHOP operation, output of P28 is complex CHOP signal waveform.

Table 4

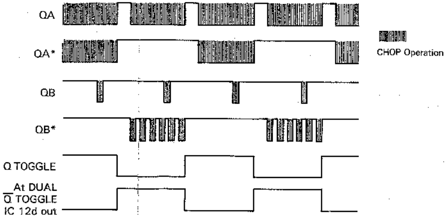
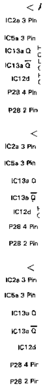
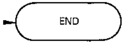
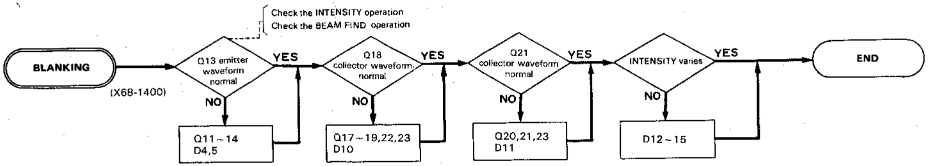

QA
QA*
QB
QB*
Q TOGGLE
At DUAL $\overline{Q}$ TOGGLE IC 12d out
CHOP Operation

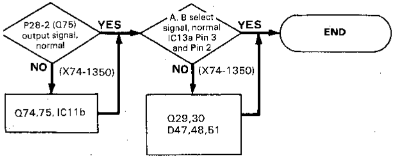
Fig. 8 RELATIONSHIP BETWEEN A, B SWEEP AND QA, QB


IC2a 3 Pin
IC5a 3 Pin
IC13a Q
IC13a $\overline{Q}$
IC12d
P28 4 Pin
P28 2 Pin
IC2a 3 Pin
IC5a 3 Pin
IC13a Q
IC13a $\overline{Q}$
IC12d
P28 4 Pin
P28 2 Pin
IC2a 3 Pin
IC5a 3 Pin
IC13a Q
IC13a $\overline{Q}$
IC12d
P28 4 Pir
P28 2 Pir



TROUBLESHOOTING


Check the INTENSITY operation
Check the BEAM FIND operation
BLANKING
(X68-1400)
Q13 emitter waveform normal
YES
NO
Q11～14
D4,5
Q18 collector waveform normal
YES
NO
Q17～19,22,23
D10
Q21 collector waveform normal
YES
NO
Q20,21,23
D11
INTENSITY varies
YES
NO
D12～15
END

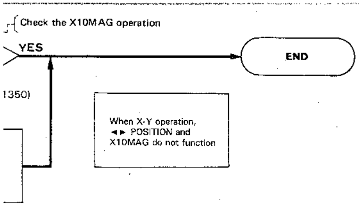

P28-2 (Q75) output signal, normal
YES
NO
(X74-1350)
Q74,75, IC11b
A, B select signal, normal IC13a Pin 3 and Pin 2
YES
NO
(X74-1350)
Q29,30
D47,48,51
END

BLANKING CONTROL

HORIZ DISPLAY	P48 X-Y BUFFER 15Pin	IC13a				IC12d OUT	P28	
		IN		OUT			A. blanking 4 Pin	B. blanking 2 Pin
		S	R	Q	$\overline{Q}$			
A	H	H	L	H	L	H	QA	H
ALT	H	L	L	TOGGLE		H	QA*	QB
A-INT-B	H	H	L	H	L	H	QA	QB
B-DLY'D	H	L	H	L	H	H	H	QB
DUAL	H	L	L	TOGGLE		TOGGLE	QA*	QB*
X-Y	L	H	L	H	L	H	L	H

Complex waveform IC11b output. When CHOP operation, output of P28 is complex CHOP signal waveform.

Table 4


Check the X10MAG operation
YES
1350)
END

When X-Y operation, ◄► POSITION and X10MAG do not function

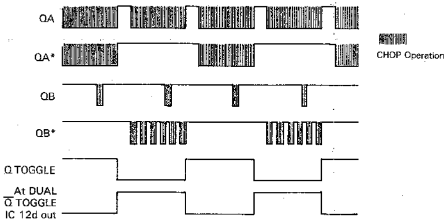

QA
QA*
QB
QB*
Q TOGGLE
At DUAL
Q̄ TOGGLE
IC 12d out
CHOP Operation

Fig. 8 RELATIONSHIP BETWEEN A, B SWEEP AND QA, QB

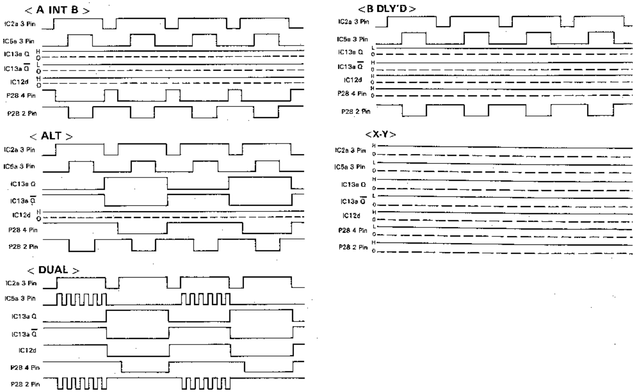
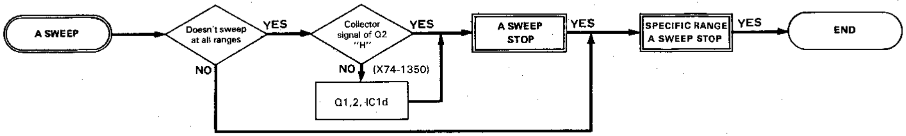
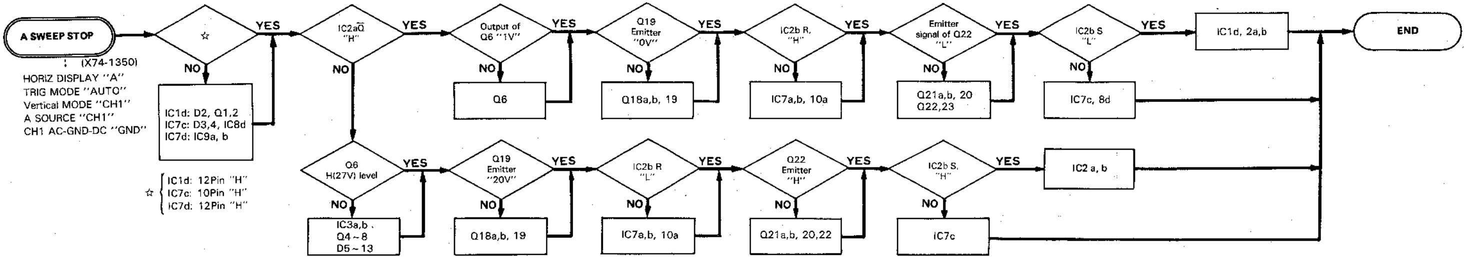

< A INT B >
< B DLY'D >
< ALT >
< X-Y >
< DUAL >
IC2a 3 Pin
IC5a 3 Pin
IC13a Q
IC13a Q̄
IC12d
P28 4 Pin
P28 2 Pin
H
L

Fig. 9 BLANKING CONTROL

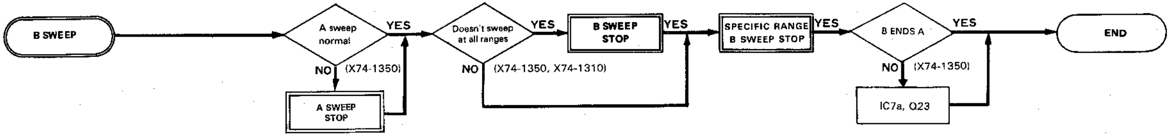
TROUBLESHOOTING


A SWEEP
Doesn't sweep at all ranges
YES
NO
Collector signal of Q2 "H"
YES
NO
(X74-1350)
Q1,2, IC1d
A SWEEP STOP
YES
SPECIFIC RANGE A SWEEP STOP
YES
END

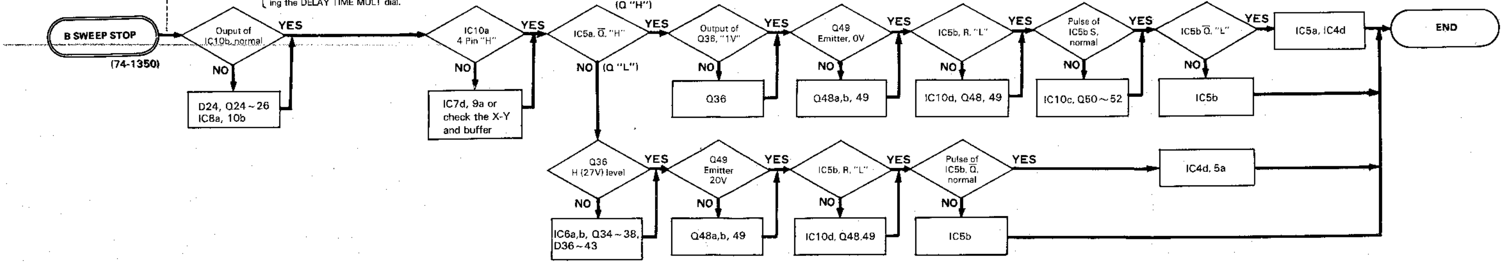

A SWEEP STOP
☆
YES
NO
IC1d: D2, Q1,2
IC7c: D3,4, IC8d
IC7d: IC9a, b
IC2aQ̄ "H"
YES
NO
Output of Q6 "1V"
YES
NO
Q6
Q19 Emitter "0V"
YES
NO
Q18a,b, 19
IC2b R, "H"
YES
NO
IC7a,b, 10a
Emitter signal of Q22 "L"
YES
NO
Q21a,b, 20
Q22,23
IC2b S "L"
YES
NO
IC7c, 8d
IC1d, 2a,b
END
Q6 H(27V) level
YES
NO
IC3a,b
Q4~8
D5~13
Q19 Emitter "20V"
YES
NO
Q18a,b, 19
IC2b R "L"
YES
NO
IC7a,b, 10a
Q22 Emitter "H"
YES
NO
Q21a,b, 20,22
IC2b S, "H"
YES
NO
IC7c
IC2 a, b

(X74-1350)
HORIZ DISPLAY "A"
TRIG MODE "AUTO"
Vertical MODE "CH1"
A SOURCE "CH1"
CH1 AC-GND-DC "GND"

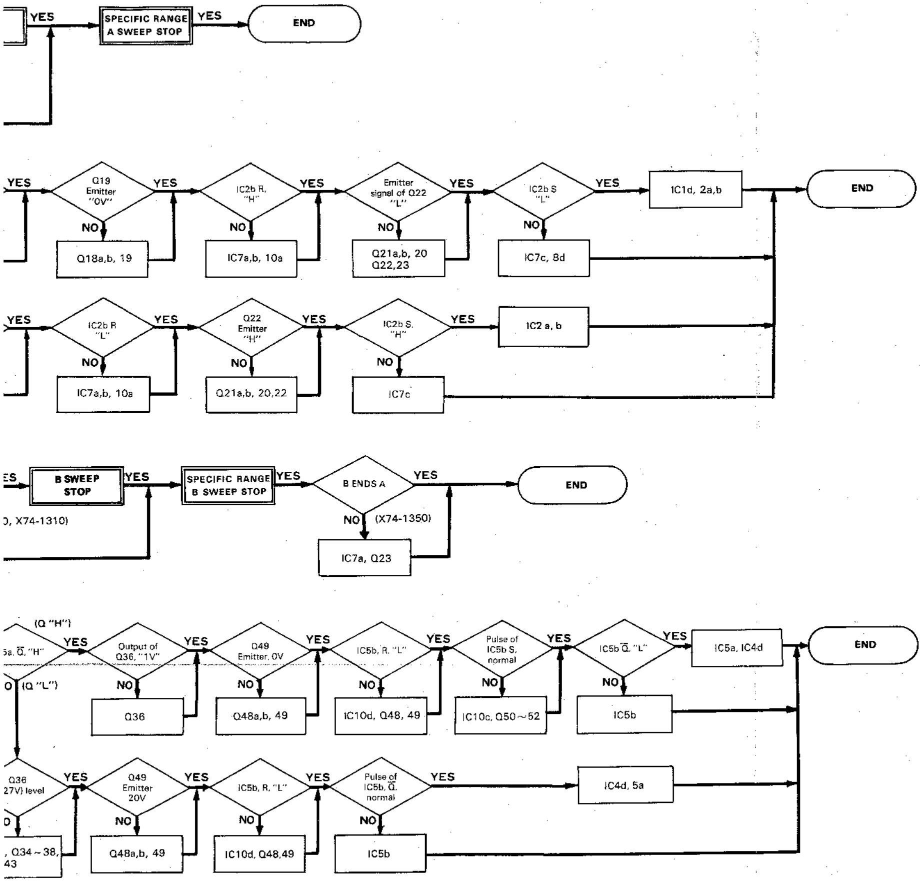
☆ IC1d: 12Pin "H"
IC7c: 10Pin "H"
IC7d: 12Pin "H"

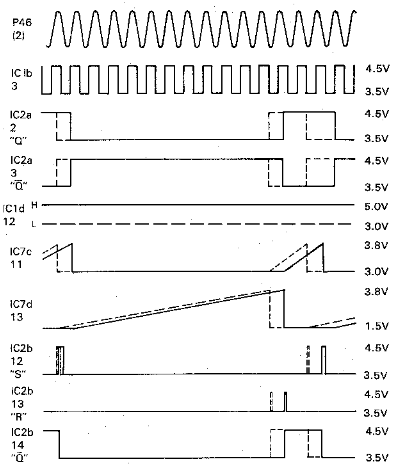

B SWEEP
A sweep normal
YES
NO
(X74-1350)
A SWEEP STOP
Doesn't sweep at all ranges
YES
NO
(X74-1350, X74-1310)
B SWEEP STOP
YES
SPECIFIC RANGE B SWEEP STOP
YES
B ENDS A
YES
NO
(X74-1350)
IC7a, Q23
END

Confirm that the voltage changes by turning the DELAY TIME MULT dial.


B SWEEP STOP
(74-1350)
Ouput of IC10b, normal
YES
NO
D24, Q24~26
IC8a, 10b
IC10a 4 Pin "H"
YES
NO
IC7d, 9a or check the X-Y and buffer
IC5a, Q̄, "H"
(Q "H")
YES
NO
(Q "L")
Output of Q36, "1V"
YES
NO
Q36
Q49 Emitter, 0V
YES
NO
Q48a,b, 49
IC5b, R, "L"
YES
NO
IC10d, Q48, 49
Pulse of IC5b S, normal
YES
NO
IC10c, Q50~52
IC5b Q̄, "L"
YES
NO
IC5b
IC5a, IC4d
END
Q36 H (27V) level
YES
NO
IC6a,b, Q34~38, D36~43
Q49 Emitter 20V
YES
NO
Q48a,b, 49
IC5b, R, "L"
YES
NO
IC10d, Q48.49
Pulse of IC5b, Q̄, normal
YES
NO
IC5b
IC4d, 5a

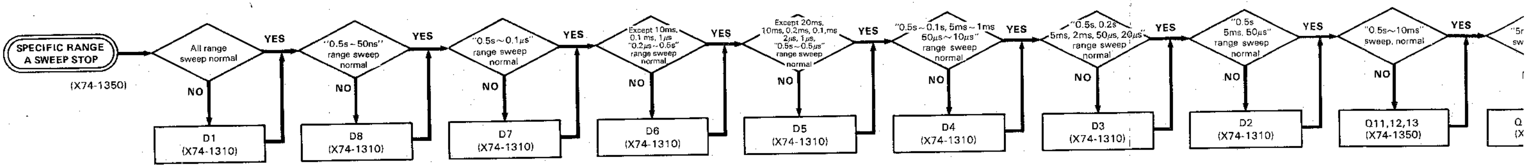
TROUBLESHOOTING

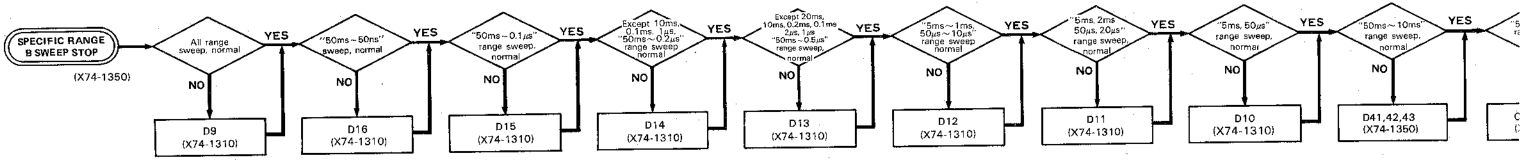

YES
SPECIFIC RANGE A SWEEP STOP
YES
END
YES
Q19 Emitter "0V"
YES
IC2b R. "H"
YES
Emitter signal of Q22 "L"
YES
IC2b S "L"
YES
IC1d, 2a,b
END
NO
Q18a,b, 19
NO
IC7a,b, 10a
NO
Q21a,b, 20 Q22,23
NO
IC7c, 8d
YES
IC2b R "L"
YES
Q22 Emitter "H"
YES
IC2b S. "H"
YES
IC2 a, b
NO
IC7a,b, 10a
NO
Q21a,b, 20,22
NO
IC7c
B SWEEP STOP
YES
SPECIFIC RANGE B SWEEP STOP
YES
B ENDS A
YES
END
), X74-1310)
NO
(X74-1350)
IC7a, Q23
(Q "H")
YES
5a, Q̄, "H"
Output of Q36, "1V"
YES
Q49 Emitter, 0V
YES
IC5b, R. "L"
YES
Pulse of IC5b S. normal
YES
IC5b Q̄. "L"
YES
IC5a, IC4d
END
O
(Q "L")
NO
Q36
NO
Q48a,b, 49
NO
IC10d, Q48, 49
NO
IC10c, Q50～52
NO
IC5b
Q36
27V) level
YES
Q49 Emitter 20V
YES
IC5b, R. "L"
YES
Pulse of IC5b, Q̄. normal
YES
IC4d, 5a
D
NO
Q48a,b, 49
NO
IC10d, Q48,49
NO
IC5b
, Q34～38, 43

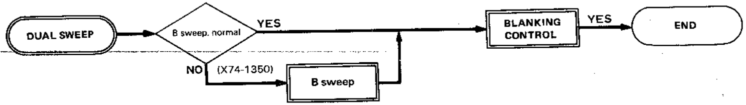


Note: Broke-line auto free run (at non-signal)

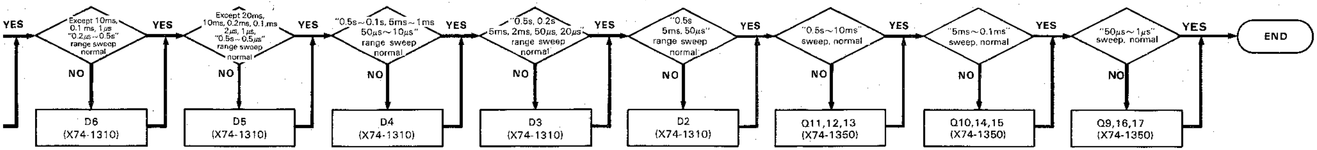
Fig. 10 Waveform in Sweep circuit (X74-1350-00)
(Input signal 1 kHz, SWEEP TIME 1 ms/div)

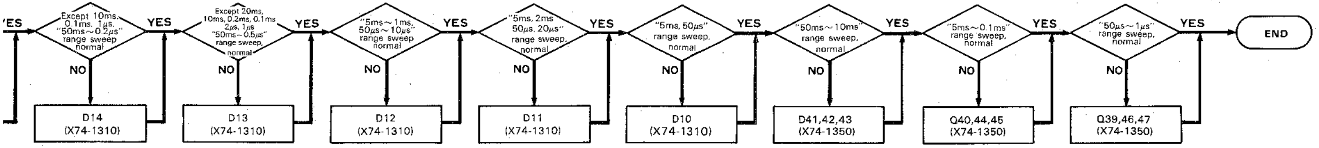

SPECIFIC RANGE
A SWEEP STOP
(X74-1350)
All range sweep normal
YES
NO
D1 (X74-1310)
"0.5s~50ns" range sweep normal
YES
NO
D8 (X74-1310)
"0.5s~0.1μs" range sweep normal
YES
NO
D7 (X74-1310)
Except 10ms, 0.1 ms, 1μs "0.2μs~0.5s" range sweep normal
YES
NO
D6 (X74-1310)
Except 20ms, 10ms, 0.2ms, 0.1,ms 2μs, 1μs, "0.5s~0.5μs" range sweep normal
YES
NO
D5 (X74-1310)
"0.5s~0.1s, 5ms~1ms 50μs~10μs" range sweep normal
YES
NO
D4 (X74-1310)
"0.5s, 0.2s 5ms, 2ms, 50μs, 20μs" range sweep normal
YES
NO
D3 (X74-1310)
"0.5s 5ms, 50μs" range sweep normal
YES
NO
D2 (X74-1310)
"0.5s~10ms" sweep, normal
YES
NO
Q11,12,13 (X74-1350)

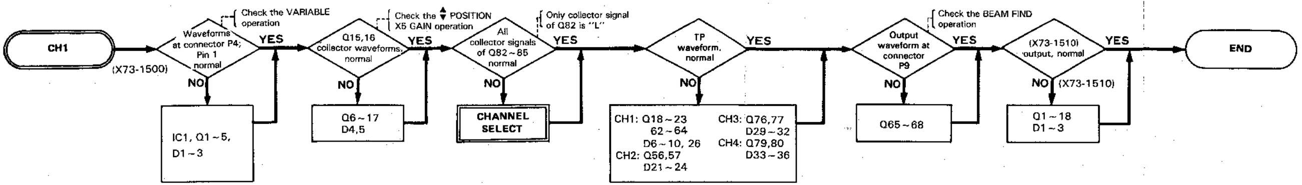

SPECIFIC RANGE
B SWEEP STOP
(X74-1350)
All range sweep, normal
YES
NO
D9 (X74-1310)
"50ms~50ns" sweep, normal
YES
NO
D16 (X74-1310)
"50ms~0.1μs" range sweep, normal
YES
NO
D15 (X74-1310)
Except 10ms, 0.1ms, 1μs, "50ms~0.2μs" range sweep normal
YES
NO
D14 (X74-1310)
Except 20ms, 10ms, 0.2ms, 0.1ms 2μs, 1μs "50ms~0.5μs" range sweep, normal
YES
NO
D13 (X74-1310)
"5ms~1ms, 50μs~10μs" range sweep normal
YES
NO
D12 (X74-1310)
"5ms, 2ms 50μs, 20μs" range sweep, normal
YES
NO
D11 (X74-1310)
"5ms, 50μs" range sweep, normal
YES
NO
D10 (X74-1310)
"50ms~10ms" range sweep, normal
YES
NO
D41,42,43 (X74-1350)

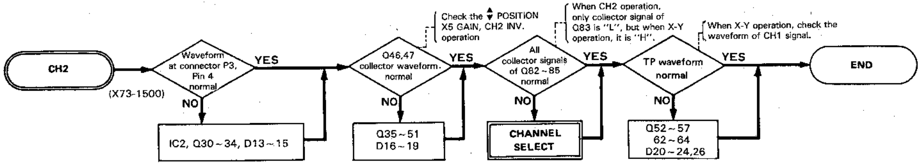

DUAL SWEEP
B sweep, normal
YES
NO
(X74-1350)
B sweep
BLANKING CONTROL
YES
END

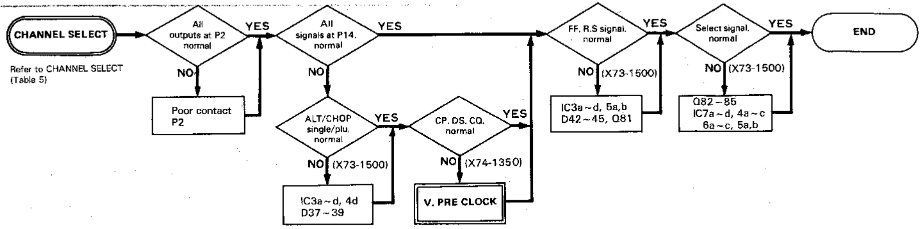
TROUBLESHOOTING


YES
Except 10ms, 0.1 ms, 1μs "0.2μs～0.5s" range sweep normal
NO
D6 (X74-1310)
YES
Except 20ms, 10ms, 0.2ms, 0.1ms 2μs, 1μs, "0.5s～0.5μs" range sweep normal
NO
D5 (X74-1310)
YES
"0.5s～0.1s, 5ms～1ms 50μs～10μs" range sweep normal
NO
D4 (X74-1310)
YES
"0.5s, 0.2s 5ms, 2ms, 50μs, 20μs" range sweep normal
NO
D3 (X74-1310)
YES
"0.5s 5ms, 50μs" range sweep normal
NO
D2 (X74-1310)
YES
"0.5s～10ms" sweep, normal
NO
Q11,12,13 (X74-1350)
YES
"5ms～0.1ms" sweep, normal
NO
Q10,14,15 (X74-1350)
YES
"50μs～1μs" sweep, normal
NO
Q9,16,17 (X74-1350)
YES
END


YES
Except 10ms, 0.1ms, 1μs, "50ms～0.2μs" range sweep normal
NO
D14 (X74-1310)
YES
Except 20ms, 10ms, 0.2ms, 0.1ms 2μs, 1μs "50ms～0.5μs" range sweep, normal
NO
D13 (X74-1310)
YES
"5ms～1ms, 50μs～10μs" range sweep normal
NO
D12 (X74-1310)
YES
"5ms, 2ms 50μs, 20μs" range sweep, normal
NO
D11 (X74-1310)
YES
"5ms, 50μs" range sweep, normal
NO
D10 (X74-1310)
YES
"50ms～10ms" range sweep, normal
NO
D41,42,43 (X74-1350)
YES
"5ms～0.1ms" range sweep, normal
NO
Q40,44,45 (X74-1350)
YES
"50μs～1μs" range sweep, normal
NO
Q39,46,47 (X74-1350)
YES
END


CH1
(X73-1500)
Waveforms at connector P4; Pin 1 normal
Check the VARIABLE operation
YES
NO
IC1, Q1 ~ 5, D1 ~ 3
Q15,16 collector waveforms. normal
Check the ▲▼ POSITION X5 GAIN operation
Q6 ~ 17 D4,5
All collector signals of Q82 ~ 85 normal
Only collector signal of Q82 is "L"
CHANNEL SELECT
TP waveform. normal
CH1: Q18 ~ 23 62 ~ 64 D6 ~ 10, 26
CH2: Q56,57 D21 ~ 24
CH3: Q76,77 D29 ~ 32
CH4: Q79,80 D33 ~ 36
Output waveform at connector P9
Check the BEAM FIND operation
Q65 ~ 68
(X73-1510) output, normal
(X73-1510)
Q1 ~ 18 D1 ~ 3
END


CH2
(X73-1500)
Waveform at connector P3, Pin 4 normal
YES
NO
IC2, Q30 ~ 34, D13 ~ 15
Q46,47 collector waveform. normal
Check the ▲▼ POSITION X5 GAIN, CH2 INV. operation
Q35 ~ 51 D16 ~ 19
All collector signals of Q82 ~ 85 normal
When CH2 operation, only collector signal of Q83 is "L", but when X-Y operation, it is "H".
CHANNEL SELECT
TP waveform normal
When X-Y operation, check the waveform of CH1 signal.
Q52 ~ 57 62 ~ 64 D20 ~ 24,26
END


CHANNEL SELECT
Refer to CHANNEL SELECT (Table 5)
All outputs at P2 normal
YES
NO
Poor contact P2
All signals at P14. normal
ALT/CHOP single/plu. normal
(X73-1500)
IC3a ~ d, 4d D37 ~ 39
CP, DS, CQ. normal
(X74-1350)
V. PRE CLOCK
FF, R.S signal. normal
IC3a ~ d, 5a,b D42 ~ 45, Q81
Select signal. normal
Q82 ~ 85 IC7a ~ d, 4a ~ c 6a ~ c, 5a,b
END

CHANNEL SELECT

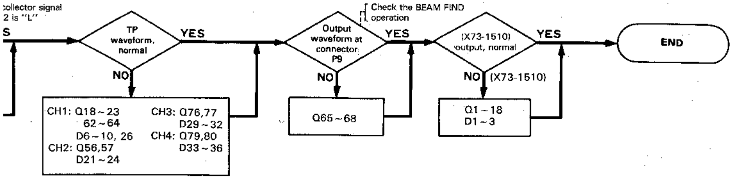
			MODE INPUT LOG OUTPUT signal (P2)						FLIP-FLOP PRESET CLEAR signal			CHAN
			CH1	CH2	DUAL	ADD	ALT	X-Y	R5a	S5a	R5b	CH1
SWEEP operation	CH1		L	H	H	H	H	H	H	L	H	L
	CH2		H	L	H	H	H	H	L	H	H	H
	DUAL	ALT	H	H	L	H	L	H	L	L	H	①
		CHOP					H					③
	ADD		H	H	H	L	H	H	L	L	H	L
	QUAD	ALT	H	H	H	H	L	H	L	L	L	
		CHOP					H					
X-Y operation			Same as above					L	H	H	H	L

Note; Number of ○ is No. of time chart. (See Fig. 11)

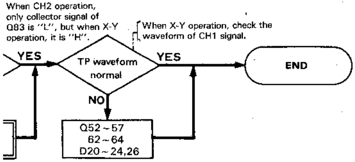
*1 Vertical MODE;
DUAL (ALT)
QUAD (ALT)
HORIZ DISPLAY; DU
Time chart No. ⑥.

Table

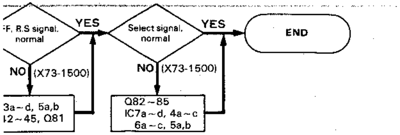
TROUBLESHOOTING



ollector signal
2 is "L"
S
TP waveform, normal
YES
NO
CH1: Q18 ~ 23
62 ~ 64
D6 ~ 10, 26
CH2: Q56,57
D21 ~ 24
CH3: Q76,77
D29 ~ 32
CH4: Q79,80
D33 ~ 36
Check the BEAM FIND operation
Output waveform at connector P9
YES
NO
Q65 ~ 68
(X73-1510) output, normal
YES
NO
(X73-1510)
Q1 ~ 18
D1 ~ 3
END



When CH2 operation, only collector signal of Q83 is "L", but when X-Y operation, it is "H".
When X-Y operation, check the waveform of CH1 signal.
YES
TP waveform normal
YES
NO
Q52 ~ 57
62 ~ 64
D20 ~ 24,26
END



F, R.S signal, normal
YES
NO
(X73-1500)
3a ~ d, 5a,b
2 ~ 45, Q81
Select signal, normal
YES
NO
(X73-1500)
Q82 ~ 85
IC7a ~ d, 4a ~ c
6a ~ c, 5a,b
END

CHANNEL SELECT

			MODE INPUT LOG OUTPUT signal (P2)						FLIP-FLOP PRESET CLEAR signal			CHANNEL SELECT signal				FLIP-FLOP OUTPUT signal				VERTICAL CLOCK (P14)				
			CH1	CH2	DUAL	ADD	ALT	X-Y	R5a	S5a	R5b	CH1	CH2	CH3	CH4	Q5a	$\overline{Q5a}$	Q5b	$\overline{Q5b}$	ALT/CHOP	Single/Plu	CP*2	DS	CQ*4
SWEEP operation	CH1		L	H	H	H	H	H	H	L	H	L	H	H	H	L	H	L	H	L	L	QA	H	H
	CH2		H	L	H	H	H	H	L	H	H	H	L	H	H	H	L	L	H	L	L	QA	H	H
	DUAL	ALT	H	H	L	H	L	H	L	L	H	①		H	H	① *1		L	H	L	H	QA	L*3	H
		CHOP					H					③				③				H		③		
	ADD		H	H	H	L	H	H	L	L	H	L	L	H	H	⑤		L	H	L	L	QA	H	H
	QUAD	ALT	H	H	H	H	L	H	L	L	L	②				② *1		②		L	H	QA	L*3	H
		CHOP					H					④				④		④		H		④		
X-Y operation			Same as above					L	H	H	H	L	H	H	H			L	H	L	L	L	H	H

Note; Number of ○ is No. of time chart. (See Fig. 11)

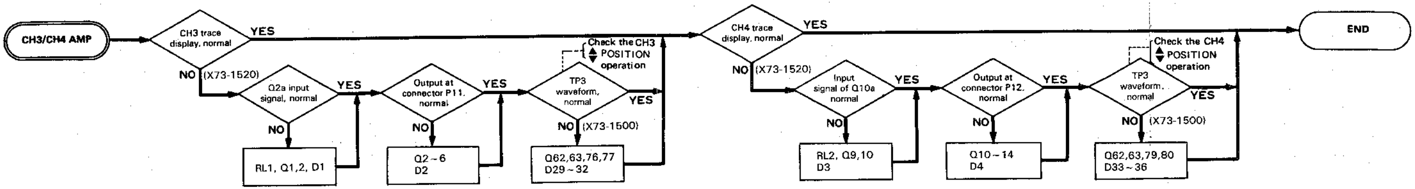
*1 Vertical MODE;
DUAL (ALT)
QUAD (ALT)
HORIZ DISPLAY; DUAL
Time chart No. ⑥.

*2 HORIZ DISPLAY;
ALT, DUAL
Time chart No. ⑥.

*3 Vertical MODE;
DUAL
QUAD
HORIZ DISPLAY;
DUAL
Time chart NO. ① ~ ④.

*4 HORIZ DISPLAY;
DUAL
Signal level "L"

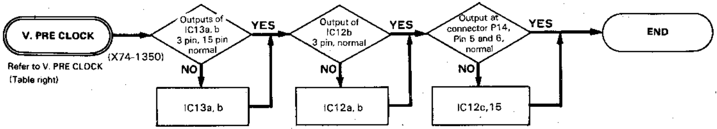
Table-5


CH3/CH4 AMP
CH3 trace display, normal
YES
NO
(X73-1520)
Q2a input signal, normal
YES
NO
RL1, Q1,2, D1
Output at connector P11, normal
YES
NO
Q2～6
D2
Check the CH3 ▲▼ POSITION operation
TP3 waveform, normal
YES
NO
(X73-1500)
Q62,63,76,77
D29～32
CH4 trace display, normal
YES
NO
(X73-1520)
Input signal of Q10a normal
YES
NO
RL2, Q9,10
D3
Output at connector P12, normal
YES
NO
Q10～14
D4
Check the CH4 ▲▼ POSITION operation
TP3 waveform, normal
YES
NO
(X73-1500)
Q62,63,79,80
D33～36
END

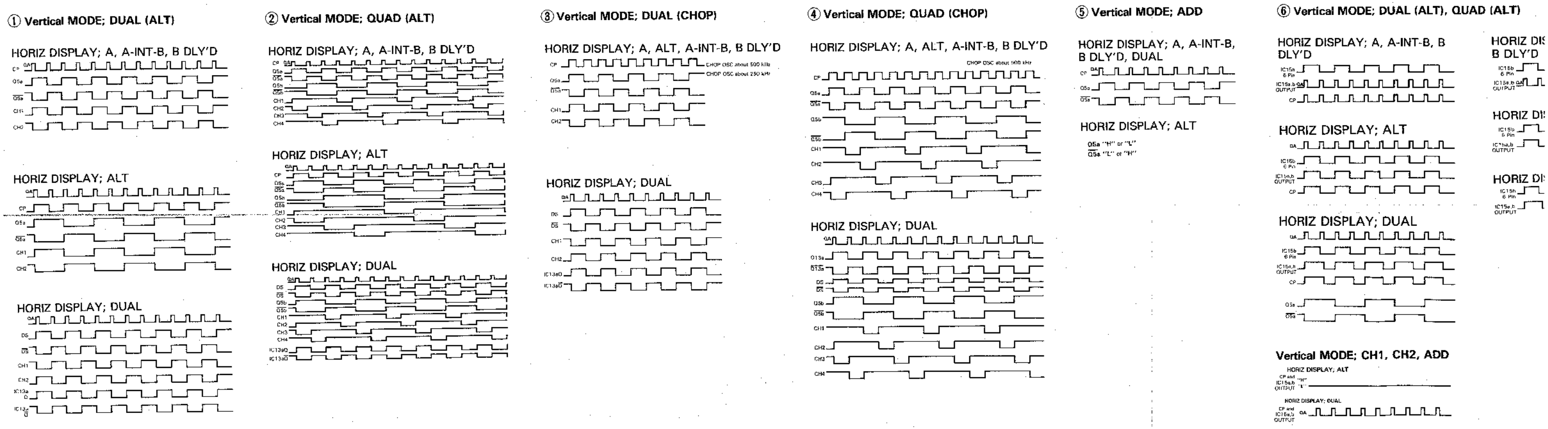
V. PRE CL

		MODE
SWEEP operation		CH1
		CH2
	DUAL	ALT
		CHO
		ADD
	QUAD	ALT
		CHO
X-Y Operatio		

Note; Number


V. PRE CLOCK
(X74-1350)
Outputs of IC13a, b 3 pin, 15 pin normal
YES
NO
IC13a, b
Output of IC12b 3 pin, normal
YES
NO
IC12a, b
Output at connector P14, Pin 5 and 6, normal
YES
NO
IC12c,15
END

Refer to V. PRE CLOCK
(Table right)


① Vertical MODE; DUAL (ALT)

② Vertical MODE; QUAD (ALT)

③ Vertical MODE; DUAL (CHOP)

④ Vertical MODE; QUAD (CHOP)

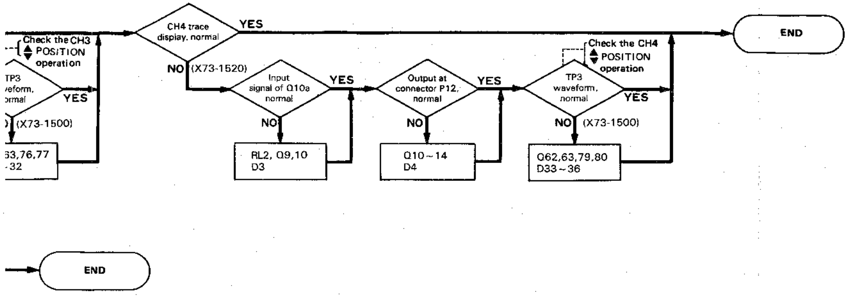
⑤ Vertical MODE; ADD

⑥ Vertical MODE; DUAL (ALT), QUAD (ALT)

Vertical MODE; CH1, CH2, ADD

Fig. 11 Time Chart

TROUBLESHOOTING


Check the CH3
POSITION
operation
TP3
waveform,
normal
YES
(X73-1500)
63,76,77
32
CH4 trace
display, normal
YES
NO
(X73-1520)
Input
signal of Q10a
normal
YES
NO
RL2, Q9,10
D3
Output at
connector P12,
normal
YES
NO
Q10~14
D4
Check the CH4
POSITION
operation
TP3
waveform,
normal
YES
NO
(X73-1500)
Q62,63,79,80
D33~36
END
END

V. PRE CLOCK

		INPUT		OUTPUT			
	MODE	ALT/CHOP	Single/Plu	Q76	IC15a,b	CP*5	DS
SWEEP operation	CH1	L	L	H	QA	QA	H
	CH2	L	L	H		QA	H
DUAL	ALT	L	H	H		QA	L*6
	CHOP	H		L		③	
	ADD	L	L	H		QA	H
QUAD	ALT	L	H	H		QA	L*6
	CHOP	H		L		④	
X-Y Operation		L	L	H	L	L	H

Note; Number of ○ is No. of time chart. (See Fig. 11)

*5 HORIZ DISPLAY;
ALT or
DUAL
Time chart No. ⑥.

*6 Vertical MODE,
DUAL or
QUAD

*7 HORIZ DISPLAY;
DUAL
Time chart No. ①~④.

V. PRE CLOCK

HORIZ DISPLAY	IC15b 7 Pin	IC15b 6 Pin*7	IC15a,b*7 OUTPUT	CQ	IC13a Q
A	L	L	QA	H	H
ALT	H	L	L	H	⑦*8
A-INT-B	L	L	QA	H	H
B DLY'D	L	L	QA	H	L
DUAL	H	L	QA	L	⑦*8
X-Y	H	L	L	H	H

*7 Vertical MODE
DUAL, or
QUAD
Time chart No. ⑥.

*8 Vertical MODE
DUAL or
QUAD
Time chart No. ①~④.

Table-6

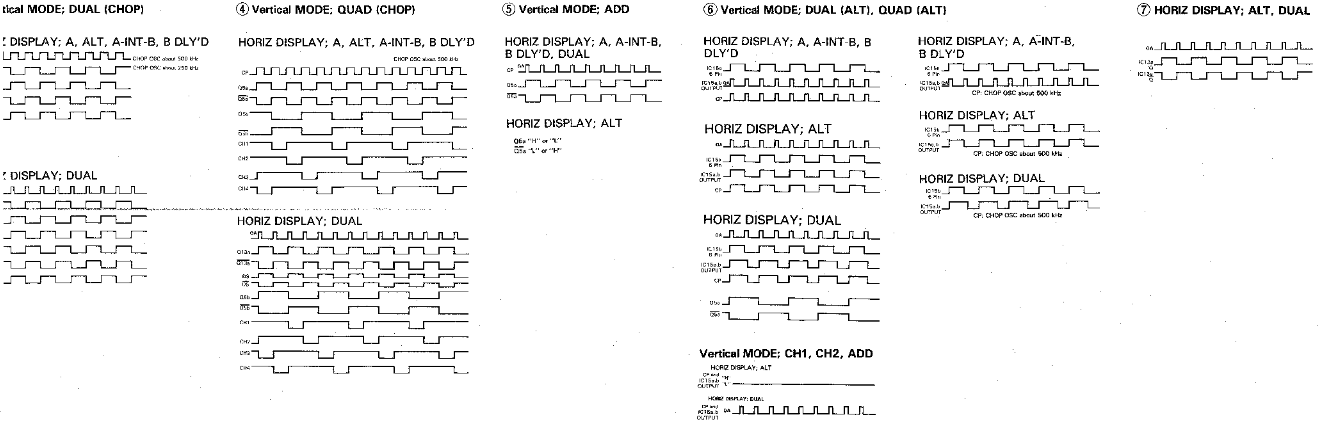
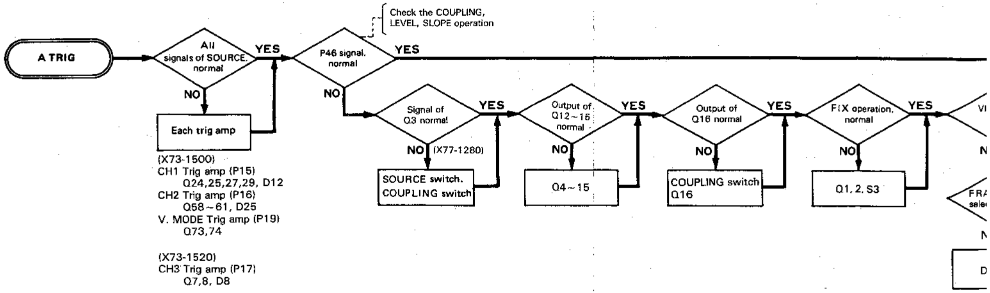
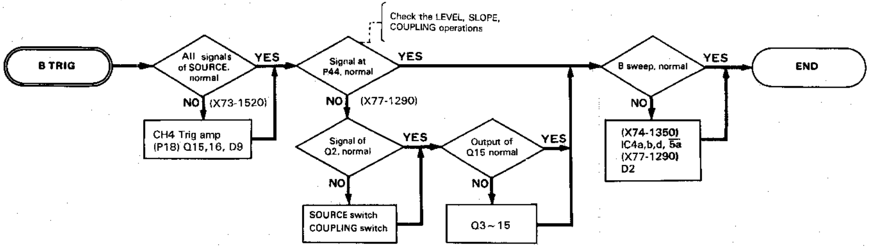

tical MODE; DUAL (CHOP)
DISPLAY; A, ALT, A-INT-B, B DLY'D
CHOP OSC about 500 kHz
CHOP OSC about 250 kHz
DISPLAY; DUAL
④ Vertical MODE; QUAD (CHOP)
HORIZ DISPLAY; A, ALT, A-INT-B, B DLY'D
CHOP OSC about 500 kHz
CP
Q5a
Q5b
CH1
CH2
CH3
CH4
HORIZ DISPLAY; DUAL
QA
Q13a
DS
Q5b
CH1
CH2
CH3
CH4
⑤ Vertical MODE; ADD
HORIZ DISPLAY; A, A-INT-B, B DLY'D, DUAL
CP
QA
Q5a
HORIZ DISPLAY; ALT
Q5a "H" or "L"
Q5a "L" or "H"
⑥ Vertical MODE; DUAL (ALT), QUAD (ALT)
HORIZ DISPLAY; A, A-INT-B, B DLY'D
IC15b 6 Pin
IC15a,b OUTPUT
CP
HORIZ DISPLAY; ALT
QA
IC15b 6 Pin
IC15a,b OUTPUT
CP
HORIZ DISPLAY; DUAL
QA
IC15b 6 Pin
IC15a,b OUTPUT
CP
Q5a
HORIZ DISPLAY; A, A-INT-B, B DLY'D
IC15b 6 Pin
IC15a,b OUTPUT
CP: CHOP OSC about 500 kHz
HORIZ DISPLAY; ALT
IC15b 6 Pin
IC15a,b OUTPUT
CP: CHOP OSC about 500 kHz
HORIZ DISPLAY; DUAL
IC15b 6 Pin
IC15a,b OUTPUT
CP: CHOP OSC about 500 kHz
Vertical MODE; CH1, CH2, ADD
HORIZ DISPLAY; ALT
CP and IC15a,b OUTPUT "H" "L"
HORIZ DISPLAY; DUAL
CP and IC15a,b OUTPUT QA
⑦ HORIZ DISPLAY; ALT, DUAL
QA
IC13a Q
IC13a Q

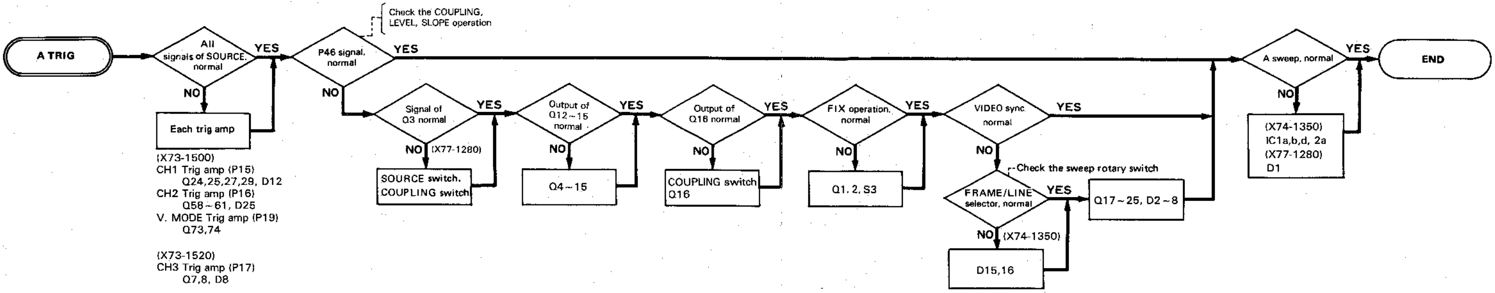
Fig. 11 Time Chart

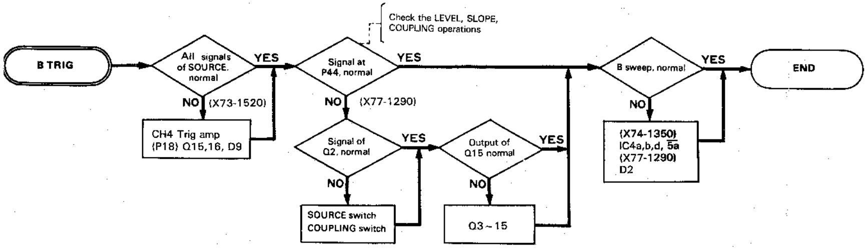
TROUBLESHOOTING


A TRIG
All signals of SOURCE, normal
YES
NO
Each trig amp
(X73-1500)
CH1 Trig amp (P15)
Q24,25,27,29, D12
CH2 Trig amp (P16)
Q58～61, D25
V. MODE Trig amp (P19)
Q73,74
(X73-1520)
CH3 Trig amp (P17)
Q7,8, D8
Check the COUPLING, LEVEL, SLOPE operation
P46 signal, normal
YES
NO
Signal of Q3 normal
YES
NO
(X77-1280)
SOURCE switch, COUPLING switch
Output of Q12～15 normal
YES
NO
Q4～15
Output of Q16 normal
YES
NO
COUPLING switch Q16
FIX operation, normal
YES
NO
Q1, 2, S3


B TRIG
All signals of SOURCE, normal
YES
NO
(X73-1520)
CH4 Trig amp (P18) Q15,16, D9
Check the LEVEL, SLOPE, COUPLING operations
Signal at P44, normal
YES
NO
(X77-1290)
Signal of Q2, normal
YES
NO
SOURCE switch COUPLING switch
Output of Q15 normal
YES
NO
Q3～15
B sweep, normal
YES
NO
(X74-1350) IC4a,b,d, 5a (X77-1290) D2
END

TROUBLESHOOTING


A TRIG
All signals of SOURCE, normal
YES
NO
Each trig amp
(X73-1500)
CH1 Trig amp (P15)
Q24,25,27,29, D12
CH2 Trig amp (P16)
Q58 ~ 61, D25
V. MODE Trig amp (P19)
Q73,74
(X73-1520)
CH3 Trig amp (P17)
Q7,8, D8
Check the COUPLING, LEVEL, SLOPE operation
P46 signal, normal
YES
NO
Signal of Q3 normal
YES
NO (X77-1280)
SOURCE switch, COUPLING switch
Output of Q12 ~ 15 normal
YES
NO
Q4 ~ 15
Output of Q16 normal
YES
NO
COUPLING switch Q16
FIX operation, normal
YES
NO
Q1, 2, S3
VIDEO sync normal
YES
NO
Check the sweep rotary switch
FRAME/LINE selector, normal
YES
NO (X74-1350)
D15,16
Q17 ~ 25, D2 ~ 8
A sweep, normal
YES
NO
(X74-1350)
IC1a,b,d, 2a
(X77-1280)
D1
END


B TRIG
All signals of SOURCE, normal
YES
NO (X73-1520)
CH4 Trig amp (P18) Q15,16, D9
Check the LEVEL, SLOPE, COUPLING operations
Signal at P44, normal
YES
NO (X77-1290)
Signal of Q2, normal
YES
NO
SOURCE switch COUPLING switch
Output of Q15 normal
YES
NO
Q3 ~ 15
B sweep, normal
YES
NO
(X74-1350)
IC4a,b,d, $\overline{5a}$
(X77-1290)
D2
END

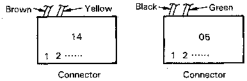
PARTS LIST

The specifications and parts list and schematic diagram may be changed without notice owing to a technical innovation.

The part No. of each connector is stamped or color-coded. The color-coding is as follows.

Black	Brown	Red	Orange	Yellow	Green	Blue	Purple	Grey	White
0	1	2	3	4	5	6	7	8	9

Example


Brown
Yellow
14
1 2 ······
Connector
Black
Green
05
1 2 ······
Connector

Each connector can be classified by the color of pin 1 and pin 2.

PARTS LIST

MAIN CHASSIS

Y70-1460-21

REF.NO	PARTS NO	NAME & DESCRIPTION
	A01-1109-02	CASE
1	A13-0763-02	FRAME
2	A13-0764-02	FRAME
3	A20-2767-05	DIE-CAST PANEL
4	A21-1045-04	DECORATIVE PANEL
5	A21-1046-04	DECORATIVE PANEL
6	A21-1047-14	DECORATIVE PANEL
7	A22-0817-33	SUB PANEL
8	A22-0833-03	SUB PANEL
9	A23-1645-12	REAR PANEL
10	A33-0501-14	REFLECTOR
—	B07-0710-02	REAR ESCUTCHEON
11	B19-0729-03	FILTER
12	B20-0927-04	**RING ANTIRUN**
—	B40-2765-04	NAME PLATE (SERIAL NO)
—	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)
—	B50-7519-00	INSTRUCTION MANUAL
—	B50-7521-00	INSTRUCTION MANUAL
13	D21-0906-04	EXTENSION SHAFT
14	D23-0801-04	SPACER
15	E01-1404-05	CRT SOCKET
16	E04-0251-05	BNC RECEPTACLE
17	E21-0654-04	TERMINAL (CAL)
18	E21-0657-04	TERMINAL (GND)
19	E21-0659-15	TERMINAL (CURRENT)
20	E23-0015-04	EARTH LUG
21	E23-0018-04	EARTH LUG
22	E23-0513-05	EARTH LUG
23	E23-0520-05	EARTH LUG
24	E23-0528-04	EARTH PLATE
25	E23-0529-04	EARTH LUG
—	E30-1818-05	POWER CORD (JIS)
—	E31-2440-05	LEAD WIRE WITH HARNESSES
—	E31-2473-05	LEAD WIRE WITH CONNECTOR
—	E31-2474-05	LEAD WIRE WITH CONNECTOR
—	E33-4047-00	WIRE ASSY
26	F05-1224-05	FUSE 1.2A
—	F07-0908-14	PROTECTION COVER
—	F07-0923-02	PROTECTION COVER
27	F10-1553-14	SHIELD PLATE (FOR CH3)
28	F10-1567-14	SHIELD PLATE
29	F10-1568-04	SHIELD PLATE (FOR SW)
30	F10-1569-04	SHIELD PLATE (FOR CPU)
31	F11-0983-02	SHIELD CASE (FOR CRT)
32	F11-0984-04	SHIELD CASE (FOR CRT)
33	F11-0985-04	SHIELD CASE
—	F15-0138-04	BLIND PLATE
—	F15-0716-24	BLIND PLATE
36	F20-0621-04	INSULATOR
37	F20-0624-04	INSULATOR (FOR BLANKING)
38	F20-0627-04	INSULATOR (FOR BATTERY)
39	F20-0639-04	INSULATOR
—	G02-0606-14	SPRING FOR HANDLE
40	G16-0602-04	REFLECTOR SHEET(L)
41	G16-0603-04	REFLECTOR SHEET(R)
42	G16-0609-04	RUBBER SHEET
—	H01-5713-04	CARTON BOX
—	H10-2812-12	FOAMED STYRENE PAD
—	H12-0535-03	PAD
—	H12-0536-03	PAD
—	H20-1719-04	VINYL COVER
43	**F10-1572-04**	**SHIELD PLATE**
—	J02-0507-05	LEG
44	J13-0033-15	FUSE HOLDER
45	J19-1620-05	CORD CLAMP
46	J19-1622-05	CORD CLAMP
47	J19-1639-04	HOLDER FOR CRT
48	J21-0392-04	HOLDER FOR LEAD
49	J21-2871-14	HOLDER FOR D.LINE
—	J21-2903-03	HOLDER FOR PROBE
—	J21-2906-05	GEAR FOR HANDLE
—	J21-2907-05	RING FOR HANDLE
50	J21-2925-13	BLACKET FOR CRT
51	J21-2926-13	BLACKET FOR CRT
52	J21-2927-04	BLACKET
53	J21-2989-04	BLACKET
54	J25-5031-02	PCB (UNMOUNTED)
55	J29-0505-04	GUIDE
56	J32-0838-04	BOSS
57	J39-0506-04	SPACER FOR V.R
58	J42-0512-14	CRT MOUNTING RUBBER
59	J42-0513-14	CRT MOUNTING RUBBER
60	J42-0514-04	BUSHING
61	J42-0515-05	BUSHING
—	J61-0049-05	WIRE BAND
62	J61-0511-05	SADDLE FOR WIRE
63	J61-0520-05	SADDLE
—	K01-0522-05	HANDLE
64	K21-0868-03	KNOB
65	K21-0869-04	KNOB
66	K21-0870-04	KNOB
67	K21-0871-04	KNOB
68	K21-0872-04	KNOB
69	K21-0873-04	KNOB
70	K21-0874-03	KNOB
71	K27-0524-14	KNOB FOR PUSH SW
72	K27-0530-04	KNOB FOR LEVER
—	N08-0611-04	DRESSED SCREW
73	N09-0402-05	SCREW
—	N09-0705-05	SCREW, HEX SOCKET FLAT HD
74	N09-0707-05	SCREW
75	N09-0709-05	SCREW
76	N09-0710-05	SCREW, SEMS PAN HD
77	N09-0711-05	SCREW
78	N09-0721-04	SCREW
79	N10-2030-41	NUT
80	N10-2060-46	NUT
81	N14-0602-34	NUT
82	N14-0609-04	NUT
83	N14-0617-05	NUT
—	N15-1030-41	WASHER, FLAT FOR M3
84	N16-0026-46	SPRING WASHER
85	N16-0030-46	SPRING WASHER
86	N16-0060-46	SPRING WASHER
87	N17-1030-41	LOCK WASHER
88	N19-0191-05	WASHER NONMETAL
89	N19-0704-04	WASHER
—	N19-0710-05	WASHER
90	N30-2606-46	SCREW, PAN HD M 2.6X6
91	N30-2608-41	SCREW, PAN HD M 2.6X8
92	N30-3006-46	SCREW, PAN HD M 3X6
93	N30-3008-41	SCREW, PAN HD M 3X8
94	N32-2006-46	SCREW, FLAT HD M 2X6
95	N32-2606-46	SCREW, FLAT HD M 2.6X6
96	N32-3006-46	SCREW, FLAT HD M 3X6
97	N32-3008-41	SCREW, FLAT HD M 3X8
98	N89-3006-46	SCREW, BINDING TAP TITE
99	N89-3010-41	SCREW, BINDING TAP TITE
—	R92-0150-05	JUMPING RES. ZERO OHM
100	S02-4502-05	ROTARY SWITCH
—	W01-0503-04	CORD WRAP
101	W02-0413-05	SWITCHING POWER SUPPLY
102	W02-0414-05	HIGH VOLTAGE BLOCK
—	W09-0405-05	LITHIUM BATTERY 3V 0.2AH
103	X68-1400-00	POWER BLANKING UNIT
104	X70-1020-00	FILTER UNIT
105	X73-1500-00	V.PRE AMP UNIT
106	X73-1510-00	V.OUTPUT AMP UNIT
107	X73-1520-00	CH3,CH4 AMP UNIT
108	X74-1310-00	SWEEP ROTARY UNIT
109	X74-1350-00	TRIG SWEEP UNIT
110	X74-1360-00	HORIZONTAL OUTPUT UNIT
111	X77-1280-00	A TRIG SWITCH UNIT
112	X77-1290-00	B TRIG UNIT
113	X81-1320-00	CPU UNIT
114	X81-1430-00	ASTIG UNIT
—	Y87-1250-00	PROBE(PC-29)
	002-0001-05	BRAIDED WIRE
	002-0006-05	BRAIDED WIRE
	150KTM31	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
	420-0010-05	ADHESIVES
	490-0007-05	TAPE
	490-0010-05	TAPE
	490-0016-05	TAPE
	490-0021-05	TAPE
	490-0027-05	TAPE
C001	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
C002	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
C003	CC45CH1H680J	CAP. CERAMIC 68P 5% 50V
C003	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV
C004	CC45CH1H680J	CAP. CERAMIC 68P 5% 50V
C004	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV
D001	K14LN222RP	DIODE, LED
D002	K14LN322GP	DIODE, LED
D003	K14LN222RP	DIODE, LED
D004	K14LN322GP	DIODE, LED
D005	K14LN322GP	DIODE, LED
D006	K14LN322GP	DIODE, LED
D007	K14LN222RP	DIODE, LED
115 D008	B30-0903-15	LED LAMP (RED)
J002	E31-2445-05	LEAD WIRE WITH CONNECTOR
J003	E31-2441-05	LEAD WIRE WITH CONNECTOR
J004	E31-2441-05	LEAD WIRE WITH CONNECTOR
J005	E31-2444-05	LEAD WIRE WITH CONNECTOR
J006	E31-2444-05	LEAD WIRE WITH CONNECTOR
J007	E31-2443-05	LEAD WIRE WITH CONNECTOR
J008	E31-2443-05	LEAD WIRE WITH CONNECTOR
J030	E31-2464-05	LEAD WIRE WITH CONNECTOR
J031	E31-2468-05	LEAD WIRE WITH CONNECTOR
J032	E31-2465-15	LEAD WIRE WITH CONNECTOR
J033	E31-2466-05	LEAD WIRE WITH CONNECTOR
J044	E31-2452-15	LEAD WIRE WITH CONNECTOR

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
J045	NO USE				
J046	E31-2449-15	LEAD WIRE WITH CONNECTOR			
J049	E31-2446-05	LEAD WIRE WITH CONNECTOR			
J050	NO USE				
J051	E31-2451-15	LEAD WIRE WITH CONNECTOR			
J052	NO USE				
J053	E31-2460-15	LEAD WIRE WITH CONNECTOR			
J054	E31-2471-05	LEAD WIRE WITH CONNECTOR			
J055	E31-2472-05	LEAD WIRE WITH CONNECTOR			
J056	E31-2475-25	LEAD WIRE WITH CONNECTOR			
J059	E31-2448-05	LEAD WIRE WITH CONNECTOR			
J060	E31-2475-25	LEAD WIRE WITH CONNECTOR			
J061	E31-2470-05	LEAD WIRE WITH CONNECTOR			
J062	E31-2469-05	LEAD WIRE WITH CONNECTOR			
L001	L39-0514-15	Y ALIGNMENT COIL			
L002	L76-0108-25	DELAY LINE			
R001	RD14BB2E105J	RES. CARBON	1M	5%	1/4W
R002	RD14BB2E105J	RES. CARBON	1M	5%	1/4W
R003	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R004	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R005	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R006	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R007	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R008	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R012	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R013	RD14BB2C330J	RES. CARBON	33	5%	1/6W
S001	S40-1504-05	PUSH SWITCH			
S002	S40-1504-05	PUSH SWITCH			
S003	S40-1504-05	PUSH SWITCH			
S004	S40-1504-05	PUSH SWITCH			
S005	S40-1504-05	PUSH SWITCH			
S006	S40-1504-05	PUSH SWITCH			
S007	S40-1504-05	PUSH SWITCH			
S008	S40-1504-05	PUSH SWITCH			
S009	S40-1504-05	PUSH SWITCH			
S010	S40-1504-05	PUSH SWITCH			
S011	S40-1504-05	PUSH SWITCH			
S012	S40-1504-05	PUSH SWITCH			
S013	S40-1504-05	PUSH SWITCH			
S014	S40-1504-05	PUSH SWITCH			
S015	S40-1504-05	PUSH SWITCH			
S016	S40-1504-05	PUSH SWITCH			
S017	S40-1504-05	PUSH SWITCH			
S018	S40-1504-05	PUSH SWITCH			
S019	S40-1504-05	PUSH SWITCH			
S020	S40-1505-05	PUSH SWITCH			
116 S023	S33-1501-05	LEVER SWITCH			
S024	S33-1501-05	LEVER SWITCH			
117 VR001	R23-1502-05	V.R.	1K B		
VR002	R23-1502-05	V.R.	1K B		
118 VR005	R23-2501-05	V.R.	5K B X2		
119 VR006	R06-2502-05	V.R. WITH PUSH,SW			
120 VR007	R29-0504-05	V.R.	1K B		

VERTICAL PREAMP UNIT

X73-1500-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E23-0015-04	EARTH LUG			
		E29-0504-05	TEFLON TERMINAL			
		J25-5038-12	PCB (UNMOUNTED)			
		001-0801-05	COATING WIRE			
		002-0001-05	BRAIDED WIRE			
E-2	C001	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
E-1	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-1	C003	CC45CH1H151J	CAP. CERAMIC	150P	5%	50V
E-1	C004	CE04W1A470M	CAP. ELECTRO	47	20%	10V
E-1	C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-1	C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C007	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C008	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-1	C009	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
E-2	C010	CM93BD2A680J	CAP. MICA	68P	5%	100V
E-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C012	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C013	CK45B1H472K	CAP. CERAMIC	4700P	10%	50V
—	C014	NO USE				
D-1	C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C017	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C020	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C021	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
D-1	C022	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C025	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C027	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
C-1	C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C034	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
C-1	C035	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
E-2	C036	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
E-3	C037	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C038	CC45CH1H151J	CAP. CERAMIC	150P	5%	50V
E-3	C039	CE04W1A470M	CAP. ELECTRO	47	20%	10V
E-3	C040	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C041	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C043	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-3	C044	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
E-2	C045	CM93BD2A680J	CAP. MICA	68P	5%	100V
E-2	C046	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C048	CK45B1H472K	CAP. CERAMIC	4700P	10%	50V
—	C049	NO USE				
D-3	C050	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C051	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C052	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C053	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C054	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C055	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C056	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
D-3	C057	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C-3	C058	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C059	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C060	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C061	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C062	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
D-1	C063	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V
C-3	C064	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
C-3	C065	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C066	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C067	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C068	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
B-2	C069	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C070	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C071	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V
B-2	C072	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V
B-1	C073	CC45CH1H100D	CAP. CERAMIC	10P	0.5P	50V
B-1	C074	CC45CH1H100D	CAP. CERAMIC	10P	0.5P	50V
B-1	C075	CC45SL1H151J	CAP. CERAMIC	150P	5%	50V
B-1	C076	CC45SL1H151J	CAP. CERAMIC	150P	5%	50V
B-1	C077	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C080	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C081	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C082	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C083	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
B-2	C084	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C085	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C086	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
B-3	C087	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C088	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C089	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C-2	C090	CE04W1C100M	CAP. ELECTRO	10	20%	16V

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-2	C091	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C-2	C092	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C-2	C093	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C-2	C094	CE04W1C100M	CAP. ELECTRO	10	20%	16V
B-2	C095	CE04W1C100M	CAP. ELECTRO	10	20%	16V
B-1	C096	CE04W1C100M	CAP. ELECTRO	10	20%	16V
B-3	C097	CE04W1C100M	CAP. ELECTRO	10	20%	16V
A-3	C098	CE04W1C101M	CAP. ELECTRO	100	20%	16V
B-3	C099	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C100	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
D-2	C101	CE04W1A470M	CAP. ELECTRO	47	20%	10V
D-2	C102	CE04W1A470M	CAP. ELECTRO	47	20%	10V
D-2	C103	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C104	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C105	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C106	CE04W1C100M	CAP. ELECTRO	10	20%	16V
B-1	C107	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C-3	C108	CE04W1C100M	CAP. ELECTRO	10	20%	16V
B-2	C109	CE04W1C100M	CAP. ELECTRO	10	20%	16V
A-3	C110	CE04W1C101M	CAP. ELECTRO	100	20%	16V
D-2	C111	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
D-2	C112	CE04W1A470M	CAP. ELECTRO	47	20%	10V
D-2	C113	CE04W1A470M	CAP. ELECTRO	47	20%	10V
A-1	C114	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C115	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C116	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C117	CK45 F1H103Z	CAP. CERAMIC	0.01		50V
A-2	C118	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
—	C119	NO USE				
C-2	C120	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C121	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
C-2	C122	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
D-2	C123	CE04W1A470M	CAP. ELECTRO	47	20%	10V
D-2	C124	CE04W1A470M	CAP. ELECTRO	47	20%	10V
D-1	C125	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
D-3	C126	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
B-1	C127	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C-1	C128	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
	C129	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V
E-2	D001	1S1544A	DIODE			
E-2	D002	1S1544A	DIODE			
E-1	D003	MTZ3.3JA	DIODE, ZENER	3.2V		
D-1	D004	GMA-01	DIODE			
D-1	D005	GMA-01	DIODE			
C-1	D006	GMA-01	DIODE			
B-2	D007	GMA-01	DIODE			
B-2	D008	GMA-01	DIODE			
B-2	D009	GMA-01	DIODE			
B-2	D010	GMA-01	DIODE			
C-1	D011	MTZ3.3JA	DIODE, ZENER	3.2V		
C-1	D012	MTZ3.3JA	DIODE, ZENER	3.2V		
E-2	D013	1S1544A	DIODE			
E-2	D014	1S1544A	DIODE			
E-3	D015	MTZ3.3JA	DIODE, ZENER	3.2V		
D-2	D016	GMA-01	DIODE			
D-2	D017	GMA-01	DIODE			
D-2	D018	MTZ7.5JA	DIODE, ZENER	7.1V		
C-2	D019	1N60	DIODE, GERMA			
C-2	D020	GMA-01	DIODE			
B-2	D021	GMA-01	DIODE			
B-2	D022	GMA-01	DIODE			
B-2	D023	GMA-01	DIODE			
B-2	D024	GMA-01	DIODE			
C-3	D025	MTZ3.3JA	DIODE, ZENER	3.2V		
B-2	D026	MTZ7.5JA	DIODE, ZENER	7.1V		
A-1	D027	GMA-01	DIODE			
A-1	D028	MTZ7.5JA	DIODE, ZENER	7.1V		
B-2	D029	GMA-01	DIODE			
B-2	D030	GMA-01	DIODE			
B-2	D031	GMA-01	DIODE			
B-2	D032	GMA-01	DIODE			
B-2	D033	GMA-01	DIODE			
B-2	D034	GMA-01	DIODE			
B-2	D035	GMA-01	DIODE			
B-2	D036	GMA-01	DIODE			
A-1	D037	GMA-01	DIODE			
A-1	D038	GMA-01	DIODE			
A-1	D039	GMA-01	DIODE			
A-1	D040	GMA-01	DIODE			
A-1	D041	GMA-01	DIODE			
A-1	D042	GMA-01	DIODE			
A-1	D043	GMA-01	DIODE			
A-1	D044	GMA-01	DIODE			
A-1	D045	GMA-01	DIODE			
A-2	D046	GMA-01	DIODE			
E-2	IC001	LF441ACN	IC, LOW-POWER JFET OP-AMP			
E-2	IC002	LF441ACN	IC, LOW-POWER JFET OP-AMP			
A-1	IC003	SN7400N	IC, QUAD 2-INPUT NAND			
A-2	IC004	MC10104L	IC, QUAD 2-INPUT AND GATE			
A-2	IC005	MC10131L	IC, DUAL D-FFS			
A-2	IC006	MC10102L	IC, QUAD 2-INPUT NOR GATE			
A-2	IC007	MC10102L	IC, QUAD 2-INPUT NOR GATE			
D-2	IC008	LM337LZ	IC, REGULATOR			
D-2	IC009	LM317LZ	IC, REGULATOR			
D-2	L001	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L002	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L003	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L004	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L005	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L006	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L007	L40-4791-02	FERRI INDUCTOR	4.7UH		
B-3	L008	L40-4791-02	FERRI INDUCTOR	4.7UH		
B-1	L009	L40-4791-02	FERRI INDUCTOR	4.7UH		
B-3	L010	L40-4791-02	FERRI INDUCTOR	4.7UH		
A-3	L011	L40-1011-04	FERRI INDUCTOR	100UH		
D-2	L012	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L013	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L014	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L015	L40-4791-02	FERRI INDUCTOR	4.7UH		
B-1	L016	L40-4791-02	FERRI INDUCTOR	4.7UH		
C-2	L017	L40-4791-02	FERRI INDUCTOR	4.7UH		
B-2	L018	L40-4791-02	FERRI INDUCTOR	4.7UH		
—	L019	NO USE				
D-2	L020	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L021	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L022	L40-4791-02	FERRI INDUCTOR	4.7UH		
D-2	L023	L40-4791-02	FERRI INDUCTOR	4.7UH		
	P001	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P002	E40-1273-05	PIN CONNECTOR	12 CONTACT		
	P003	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P004	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P005	E40-0373-05	PIN CONNECTOR	3 CONTACT		
	P006	E40-0373-05	PIN CONNECTOR	3 CONTACT		
	P007	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P008	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P009	E40-0315-05	PIN CONNECTOR	3P		
	P010	NO USE				
	P011	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P012	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P013	NO USE				
	P014	E40-0773-05	PIN CONNECTOR	7P		
	P015	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P016	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P019	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P020	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P021	E40-0273-05	PIN CONNECTOR	2 CONTACT		
E-1	Q001	J304	FET. N-CHANNEL			
E-1	Q002	2SC2671(H)	TR. SI, NPN			
E-1	Q003	2SC2671(H)	TR. SI, NPN			
E-1	Q004	2SC2671(H)	TR. SI, NPN			
E-1	Q005	2SC2671(H)	TR. SI, NPN			
D-1	Q006	2SC3354(T,S)	TR. SI, NPN			
D-1	Q007	2SC3354(T,S)	TR. SI, NPN			
D-1	Q008	2SC1733	TR. SI, NPN			
D-1	Q009	2SC3315(C,D)	TR. SI, NPN			
D-1	Q010	2SC3315(C,D)	TR. SI, NPN			
D-1	Q011	2SC3315(C,D)	TR. SI, NPN			
D-1	Q012	2SC3315(C,D)	TR. SI, NPN			
D-1	Q013	2SC3315(C,D)	TR. SI, NPN			
D-2	Q014	2SC3311(R)	TR. SI, NPN			
C-1	Q015	2SA1161	TR. SI, PNP			
D-1	Q016	2SA1161	TR. SI, PNP			
C-1	Q017	2SC3311(R)	TR. SI, NPN			
C-1	Q018	2SA1323(B)	TR. SI, PNP			
C-1	Q019	2SA1323(B)	TR. SI, PNP			
C-1	Q020	2SC3315(C,D)	TR. SI, NPN			
C-1	Q021	2SC3315(C,D)	TR. SI, NPN			
C-2	Q022	2SC2671(H)	TR. SI, NPN			
C-2	Q023	2SC2671(H)	TR. SI, NPN			
C-1	Q024	2SC2671(H)	TR. SI, NPN			
C-1	Q025	2SC2671(H)	TR. SI, NPN			
C-1	Q026	2SC3315(C,D)	TR. SI, NPN			
C-1	Q027	2SC3315(C,D)	TR. SI, NPN			
C-1	Q028	2SC3354(T,S)	TR. SI, NPN			
C-1	Q029	2SC3354(T,S)	TR. SI, NPN			
E-2	Q030	J304	FET. N-CHANNEL			
E-3	Q031	2SC2671(H)	TR. SI, NPN			
E-3	Q032	2SC2671(H)	TR. SI, NPN			
E-3	Q033	2SC2671(H)	TR. SI, NPN			
E-3	Q034	2SC2671(H)	TR. SI, NPN			
D-3	Q035	2SC3354(T,S)	TR. SI, NPN			
D-3	Q036	2SC3354(T,S)	TR. SI, NPN			
D-3	Q037	2SC1733	TR. SI, NPN			
D-3	Q038	2SC3315(C,D)	TR. SI, NPN			
D-3	Q039	2SC3315(C,D)	TR. SI, NPN			
D-3	Q040	2SC3315(C,D)	TR. SI, NPN			
D-3	Q041	2SC3315(C,D)	TR. SI, NPN			
D-2	Q042	2SC3315(C,D)	TR. SI, NPN			
D-2	Q043	2SC3311(R)	TR. SI, NPN			
C-3	Q044	2SA1161	TR. SI, PNP			
C-3	Q045	2SA1161	TR. SI, PNP			
D-3	Q046	2SA1161	TR. SI, PNP			
D-3	Q047	2SA1161	TR. SI, PNP			
D-2	Q048	2SC3311(R)	TR. SI, NPN			
C-2	Q049	2SA1309(Q,R)	TR. SI, PNP			
D-2	Q050	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q051	2SC3311(R)	TR. SI, NPN			
C-3	Q052	2SA1323(B)	TR. SI, PNP			
C-3	Q053	2SA1323(B)	TR. SI, PNP			
C-2	Q054	2SC3315(C,D)	TR. SI, NPN			

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-2	Q055	2SC3315(C,D)	TR. SI, NPN			
C-2	Q056	2SC2671(H)	TR. SI, NPN			
C-2	Q057	2SC2671(H)	TR. SI, NPN			
C-3	Q058	2SC2671(H)	TR. SI, NPN			
C-3	Q059	2SC2671(H)	TR. SI, NPN			
C-3	Q060	2SC3315(C,D)	TR. SI, NPN			
C-3	Q061	2SC3354(T,S)	TR. SI, NPN			
B-2	Q062	2SC3354(T,S)	TR. SI, NPN			
B-2	Q063	2SC3354(T,S)	TR. SI, NPN			
B-2	Q064	2SA1309(Q,R)	TR. SI, PNP			
B-2	Q065	2SC3354(T,S)	TR. SI, NPN			
B-2	Q066	2SC3354(T,S)	TR. SI, NPN			
B-2	Q067	2SA1161	TR. SI, PNP			
B-2	Q068	2SA1161	TR. SI, PNP			
B-1	Q069	2SC3315(C,D)	TR. SI, NPN			
B-1	Q070	2SC3315(C,D)	TR. SI, NPN			
A-1	Q071	2SA1309(Q,R)	TR. SI, PNP			
A-1	Q072	2SC3311(R)	TR. SI, NPN			
B-3	Q073	2SA1161	TR. SI, PNP			
B-3	Q074	2SA1161	TR. SI, PNP			
B-1	Q075	2SC3311(R)	TR. SI, NPN			
B-1	Q076	2SC2671(H)	TR. SI, NPN			
B-1	Q077	2SC2671(H)	TR. SI, NPN			
B-2	Q078	2SC3311(R)	TR. SI, NPN			
B-3	Q079	2SC2671(H)	TR. SI, NPN			
B-3	Q080	2SC2671(H)	TR. SI, NPN			
A-2	Q081	2SC3311(R)	TR. SI, NPN			
A-3	Q082	2SA1309(Q,R)	TR. SI, PNP			
A-3	Q083	2SA1309(Q,R)	TR. SI, PNP			
A-3	Q084	2SA1309(Q,R)	TR. SI, PNP			
A-3	Q085	2SA1309(Q,R)	TR. SI, PNP			
B-1	Q086	2SC3311(R)	TR. SI, NPN			
B-2	Q087	2SC3311(R)	TR. SI, NPN			
E-2	R001	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
E-2	R002	RN14BK2E1803D	RES. METAL FILM	180K	0.5%	1/4W
E-2	R003	RN14BK2E8203D	RES. METAL FILM	820K	0.5%	1/4W
E-1	R004	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-1	R005	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
E-1	R006	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-1	R007	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-1	R008	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
E-1	R009	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-1	R010	RD14BB2C271J	RES. CARBON	270	5%	1/6W
E-1	R011	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-1	R012	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
E-1	R013	RN14BK2C1100F	RES. METAL FILM	110	1%	1/6W
E-1	R014	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
E-1	R015	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
E-1	R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-1	R017	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-1	R018	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R019	RD14BB2C100J	RES. CARBON	10	5%	1/6W
D-2	R020	RD14BB2C821J	RES. CARBON	820	5%	1/6W
E-1	R021	RD14BB2C510J	RES. CARBON	51	5%	1/6W
D-1	R022	RD14BB2C510J	RES. CARBON	51	5%	1/6W
E-1	R023	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-1	R024	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
E-2	R025	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R026	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
D-2	R027	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
D-2	R028	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-1	R029	RD14BB2C204J	RES. CARBON	200K	5%	1/6W
D-1	R030	RD14BB2C680J	RES. CARBON	68	5%	1/6W
D-1	R031	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R032	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-1	R033	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-1	R034	RD14BB2C680J	RES. CARBON	68	5%	1/6W
D-1	R035	RD14BB2C220J	RES. CARBON	22	5%	1/6W
	R036	NO USE				
D-1	R037	RD14BB2C151J	RES. CARBON	150	5%	1/6W
D-1	R038	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-2	R039	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-1	R040	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-1	R041	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
D-1	R042	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
D-1	R043	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R044	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R045	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R046	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-1	R047	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-1	R048	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R049	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R050	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-1	R051	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-2	R052	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R053	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-2	R054	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
D-2	R055	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-1	R056	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
D-2	R057	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R058	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R059	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R060	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
C-1	R061	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
C-1	R062	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
D-1	R063	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
C-2	R064	RD14BB2C391J	RES. CARBON	390	5%	1/6W

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-1	R065	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-1	R066	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-1	R067	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-2	R068	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-2	R069	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
C-1	R070	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R071	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R072	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R073	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
C-1	R074	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
C-1	R075	RD14BB2C391J	RES. CARBON	390	5%	1/6W
C-1	R076	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-1	R077	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R078	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R079	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R080	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R081	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R082	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R083	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
C-2	R084	RD14BB2C471J	RES. CARBON	470	5%	1/6W
C-2	R085	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
C-2	R086	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
C-2	R087	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
C-1	R088	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R089	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R092	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R093	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R094	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
C-1	R095	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
C-1	R096	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R097	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R098	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R099	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R100	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-1	R101	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-1	R102	RD14BB2C821J	RES. CARBON	820	5%	1/6W
B-1	R103	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-1	R104	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R105	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R106	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-1	R107	RD14BB2C430J	RES. CARBON	43	5%	1/6W
B-1	R108	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-1	R109	RD14BB2C430J	RES. CARBON	43	5%	1/6W
E-2	R110	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
E-2	R111	RN14BK2E1803D	RES. METAL FILM	180K	0.5%	1/4W
E-2	R112	RN14BK2E8203D	RES. METAL FILM	820K	0.5%	1/4W
E-3	R113	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-2	R114	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
E-2	R115	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-3	R116	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-2	R117	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
E-3	R118	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-3	R119	RD14BB2C271J	RES. CARBON	270	5%	1/6W
E-3	R120	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-3	R121	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
E-3	R122	RN14BK2C1100F	RES. METAL FILM	110	1%	1/6W
E-3	R123	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
E-3	R124	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
E-3	R125	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-3	R126	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-2	R127	RD14BB2C101J	RES. CARBON	100	5%	1/6W
E-3	R128	RD14BB2C100J	RES. CARBON	10	5%	1/6W
D-2	R129	RD14BB2C821J	RES. CARBON	820	5%	1/6W
E-3	R130	RD14BB2C510J	RES. CARBON	51	5%	1/6W
D-3	R131	RD14BB2C510J	RES. CARBON	51	5%	1/6W
E-2	R132	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-3	R133	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
E-2	R134	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R135	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
D-2	R136	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
D-2	R137	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-3	R138	RD14BB2C204J	RES. CARBON	200K	5%	1/6W
D-3	R139	RD14BB2C680J	RES. CARBON	68	5%	1/6W
D-3	R140	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R141	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-3	R142	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-3	R143	RD14BB2C680J	RES. CARBON	68	5%	1/6W
D-3	R144	RD14BB2C220J	RES. CARBON	22	5%	1/6W
—	R145	NO USE				
D-3	R146	RD14BB2C151J	RES. CARBON	150	5%	1/6W
D-2	R147	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-2	R148	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-2	R149	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-3	R150	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
D-3	R151	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
D-3	R152	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-3	R153	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-3	R154	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-3	R155	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-3	R156	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-3	R157	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R158	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R159	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-3	R160	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-2	R161	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R162	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-2	R163	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
D-2	R164	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R165	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
D-2	R166	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-3	R167	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R168	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R169	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R170	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
C-3	R171	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
C-2	R172	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
C-2	R173	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
C-3	R174	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R175	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R176	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R177	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R178	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
D-3	R179	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
D-2	R180	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
D-2	R181	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
C-3	R182	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R183	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-2	R184	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R185	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
C-2	R186	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-2	R187	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R188	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
—	R189	NO USE				
C-2	R190	RD14BB2C391J	RES. CARBON	390	5%	1/6W
C-3	R191	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-3	R192	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-2	R193	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
C-2	R194	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-2	R195	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-3	R196	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R197	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R198	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R199	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
C-3	R200	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
C-3	R201	RD14BB2C391J	RES. CARBON	390	5%	1/6W
C-3	R202	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-3	R203	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R204	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R205	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R206	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R207	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R208	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R209	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
C-2	R210	RD14BB2C471J	RES. CARBON	470	5%	1/6W
C-2	R211	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
C-2	R212	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
C-2	R213	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
C-2	R214	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R215	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R216	RD14BB2C471J	RES. CARBON	470	5%	1/6W
A-1	R217	RD14BB2C391J	RES. CARBON	390	5%	1/6W
C-3	R218	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R219	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R220	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
C-2	R221	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
C-3	R222	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-3	R223	RD14BB2C471J	RES. CARBON	470	5%	1/6W
C-3	R224	RD14BB2C112J	RES. CARBON	1.1K	5%	1/6W
C-3	R225	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
C-3	R226	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R227	RD14BB2C821J	RES. CARBON	820	5%	1/6W
C-3	R228	RD14BB2C430J	RES. CARBON	43	5%	1/6W
B-2	R229	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
B-2	R230	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-2	R231	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R232	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R233	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
B-2	R234	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
B-2	R235	RD14BB2C820J	RES. CARBON	82	5%	1/6W
B-2	R236	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R237	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R238	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
B-2	R239	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
B-2	R240	RD14BB2C820J	RES. CARBON	82	5%	1/6W
B-2	R241	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R242	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R243	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R244	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
B-2	R245	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
B-2	R246	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
B-2	R247	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
B-2	R248	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
B-2	R249	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-1	R250	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
B-1	R251	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-1	R252	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
B-1	R253	RD14BB2C470J	RES. CARBON	47	5%	1/6W
A-1	R254	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
A-1	R255	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-1	R256	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
B-1	R257	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-1	R258	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-1	R259	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-1	R260	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
—	R261	NO USE				

	REF.NO	PARTS NO	NAME & DESCRIPTION			
B-3	R262	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
B-3	R263	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
B-2	R264	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
B-3	R265	RD14BB2C100J	RES. CARBON	10	5%	1/6W
B-2	R266	RD14BB2C181J	RES. CARBON	180	5%	1/6W
B-2	R267	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
—	R268	NO USE				
B-3	R269	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
B-3	R270	RD14BB2C100J	RES. CARBON	10	5%	1/6W
B-3	R271	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
B-1	R272	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R273	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
—	R274	NO USE				
B-1	R275	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R276	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R277	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	R278	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	R279	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	R280	RD14BB2C100J	RES. CARBON	10	5%	1/6W
B-1	R281	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-1	R282	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-1	R283	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
B-1	R284	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
B-2	R285	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R286	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
—	R287	NO USE				
B-2	R288	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R289	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R290	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R291	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R292	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R293	RD14BB2C100J	RES. CARBON	10	5%	1/6W
B-3	R294	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-3	R295	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-3	R296	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
B-3	R297	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
A-2	R298	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-2	R299	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-2	R300	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
—	R301	NO USE				
A-2	R302	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-2	R303	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-2	R304	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-2	R305	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-2	R306	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R307	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R308	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R309	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R310	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-3	R311	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-3	R312	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-3	R313	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-3	R314	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-3	R315	RD14BB2C270J	RES. CARBON	27	5%	1/6W
A-3	R316	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-3	R317	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-3	R318	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-3	R319	RD14BB2C270J	RES. CARBON	27	5%	1/6W
A-3	R320	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-3	R321	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-3	R322	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-3	R323	RD14BB2C270J	RES. CARBON	27	5%	1/6W
A-3	R324	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-3	R325	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
A-3	R326	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-3	R327	RD14BB2C270J	RES. CARBON	27	5%	1/6W
A-3	R328	RD14BB2C331J	RES. CARBON	330	5%	1/6W
C-2	R329	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
C-2	R330	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
D-2	R331	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
D-2	R332	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
D-2	R333	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
D-2	R334	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
A-2	R335	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
E-2	TC001	C05-0030-15	CAP. TRIMMER	20P		
E-1	TC002	C05-0031-15	CAP. TRIMMER	10P		
C-2	TC003	C05-0031-15	CAP. TRIMMER	10P		
C-2	TC004	C05-0030-15	CAP. TRIMMER	20P		
E-2	TC005	C05-0030-15	CAP. TRIMMER	20P		
E-3	TC006	C05-0031-15	CAP. TRIMMER	10P		
C-2	TC007	C05-0031-15	CAP. TRIMMER	10P		
B-1	TC008	C05-0031-15	CAP. TRIMMER	10P		
B-3	TC009	C05-0031-15	CAP. TRIMMER	10P		
D-1	TP001	E23-0508-04	TEST TERMINAL			
D-3	TP002	E23-0508-04	TEST TERMINAL			
B-2	TP003	E40-0211-05	PIN CONNECTOR	2P		
D-2	VR001	R12-0539-05	RES. SEMI FIXED	200 B		
E-2	VR002	R12-3520-05	RES. SEMI FIXED	10K B		
E-1	VR003	R12-0421-05	RES. SEMI FIXED	100 B		
D-1	VR004	R12-0421-05	RES. SEMI FIXED	100 B		
D-2	VR005	R12-0421-05	RES. SEMI FIXED	100 B		
D-1	VR006	R12-0421-05	RES. SEMI FIXED	100 B		
C-2	VR007	R12-0421-05	RES. SEMI FIXED	100 B		
C-2	VR008	R12-0539-05	RES. SEMI FIXED	200 B		
C-1	VR009	R12-3520-05	RES. SEMI FIXED	10K B		

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION
B-1	VR010	R12-3520-05	RES. SEMI FIXED 10K B
D-2	VR011	R12-0539-05	RES. SEMI FIXED 200 B
D-2	VR012	R12-3520-05	RES. SEMI FIXED 10K B
E-3	VR013	R12-0421-05	RES. SEMI FIXED 100 B
D-3	VR014	R12-0421-05	RES. SEMI FIXED 100 B
D-2	VR015	R12-0421-05	RES. SEMI FIXED 100 B
C-2	VR016	R12-0421-05	RES. SEMI FIXED 100 B
D-2	VR017	R12-0421-05	RES. SEMI FIXED 100 B
C-2	VR018	R12-0421-05	RES. SEMI FIXED 100 B
B-3	VR019	R12-3520-05	RES. SEMI FIXED 10K B
B-2	VR020	R12-0539-05	RES. SEMI FIXED 200 B
B-1	VR021	R12-0540-05	RES. SEMI FIXED 500 B
B-1	VR022	R12-0539-05	RES. SEMI FIXED 200 B
B-3	VR023	R12-0540-05	RES. SEMI FIXED 500 B
B-3	VR024	R12-0539-05	RES. SEMI FIXED 200 B
C-3	VR025	R12-0539-05	RES. SEMI FIXED 200 B

VERTICAL OUTPUT AMP UNIT

X73-1510-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E23-0512-05	TERMINAL			
		F02-0501-04	HEAT SINK			
		F02-0502-05	HEAT SINK			
		J25-5039-12	PCB (UNMOUNTED)			
		L92-0110-05	BEAD CORE			
		N09-0709-05	SCREW			
		N89-3006-46	SCREW, BINDING TAP TITE			
		Z12-2014-05	TUBE (PLASTIC)			
C-1	C001	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C-2	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C004	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
—	C005	NO USE				
D-2	C006	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
E-2	C007	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C008	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
B-2	C009	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C012	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-3	C013	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
B-3	C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C015	CE04FW1V330M	CAP. ELECTRO	33	20%	35V
C-3	C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C017	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C018	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C-1	C019	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C020	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
—	C021	NO USE				
A-3	C022	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
A-3	C023	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
E-2	C024	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
E-3	C025	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
B-1	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	D001	MTZ24JC	DIODE, ZENER	24V		
D-1	D002	1S2686	DIODE			
D-2	D003	1S2686	DIODE			
E-1	L001	L33-0806-05	CHOKE COIL			
E-3	L002	L33-0806-05	CHOKE COIL			
E-3	L003	L40-2282-13	FERRI INDUCTOR	0.22UH		
E-3	L004	L40-2282-13	FERRI INDUCTOR	0.22UH		
D-3	L005	L40-4701-03	FERRI INDUCTOR	47UH		
C-3	L006	L40-4701-03	FERRI INDUCTOR	47UH		
C-3	L007	L40-4701-03	FERRI INDUCTOR	47UH		
A-3	L008	L40-4701-03	FERRI INDUCTOR	47UH		
	L009	NO USE				
	P010	E40-0315-05	PIN CONNECTOR	3P		
	P013	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P020	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P021	NO USE				
	P022	E40-0773-05	PIN CONNECTOR	7P		
B-1	Q001	2SC2671(H)	TR. SI, NPN			
B-2	Q002	2SC2671(H)	TR. SI, NPN			
C-1	Q003	2SA1206	TR, SI, PNP			
C-2	Q004	2SA1206	TR, SI, PNP			
C-1	Q005	2SC2671(H)	TR. SI, NPN			
C-3	Q006	2SC2671(H)	TR. SI, NPN			
C-1	Q007	2SC2644	TR. SI, NPN			
C-1	Q008	2SC2644	TR. SI, NPN			
C-3	Q009	2SC2644	TR. SI, NPN			
C-3	Q010	2SC2644	TR. SI, NPN			
E-1	Q011	2SC1164	TR. SI, NPN			
E-3	Q012	2SC1164	TR. SI, NPN			
B-2	Q013	2SA1309(Q,R)	TR. SI, PNP			
B-2	Q014	2SC3311(Q,R)	TR. SI, NPN			
B-2	Q015	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q016	2SA1309(Q,R)	TR. SI, PNP			
C-3	Q017	2SC3311(Q,R)	TR. SI, NPN			
B-2	Q018	2SA1309(Q,R)	TR. SI, PNP			
A-2	R001	RN14BK2C2000F	RES. METAL FILM	200	1%	1/6W
A-1	R002	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-2	R003	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R004	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-1	R005	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
B-2	R006	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
B-1	R007	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R008	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R009	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R010	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
C-2	R011	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
C-1	R012	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R013	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R014	RD14BB2E361J	RES. CARBON	360	5%	1/4W
C-2	R015	RD14BB2E361J	RES. CARBON	360	5%	1/4W
C-1	R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R017	RD14BB2C220J	RES. CARBON	22	5%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-3	R018	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
—	R020	NO USE				
D-2	R021	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
—	R022	NO USE				
D-2	R023	RD14BB2C681J	RES. CARBON	680	5%	1/6W
C-2	R024	RN14BK2E68R0F	RES. METAL FILM	68.0	1%	1/4W
C-2	R025	RN14BK2E68R0F	RES. METAL FILM	68.0	1%	1/4W
C-2	R026	RD14BB2E8R2J	RES. CARBON	8.2	5%	1/4W
D-1	R027	RD14CB2E220J	RES. CARBON	22	5%	1/4W
D-3	R028	RD14CB2E220J	RES. CARBON	22	5%	1/4W
E-2	R029	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R030	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R031	RS14AB3H561J	RES. METAL FILM	560	5%	5W
E-2	R032	RS14AB3H561J	RES. METAL FILM	560	5%	5W
E-1	R033	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-3	R034	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-2	R035	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-2	R036	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
B-2	R037	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-2	R038	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-2	R039	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
A-2	R040	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
B-3	R041	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
C-2	R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R043	RN14BK2C47R0F	RES. METAL FILM	47.0	1%	1/6W
B-2	R044	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R045	RN14BK2C47R0F	RES. METAL FILM	47.0	1%	1/6W
B-2	R046	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
C-3	R047	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
C-3	R048	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
C-3	R049	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R050	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R051	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-2	R052	RD14BB2C131J	RES. CARBON	130	5%	1/6W
D-2	R053	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R054	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
B-1	R055	RD14BB2C681J	RES. CARBON	680	5%	1/6W
B-2	R056	RD14BB2C681J	RES. CARBON	680	5%	1/6W
D-1	R057	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
	R058	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	TC001	C05-0412-05	CAP. TRIMMER	20P		
B-1	TC002	C05-0412-05	CAP. TRIMMER	20P		
D-1	TH001	SDT1000	THERMISTOR			
B-2	VR001	R12-0543-05	RES. SEMI FIXED	500 B		
C-2	VR002	R12-0543-05	RES. SEMI FIXED	500 B		
A-2	VR003	R12-0543-05	RES. SEMI FIXED	500 B		

CH3, CH4 AMP UNIT

X73-1520-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		J21-2990-04	MOUNTING HARDWEAR			
		J25-5039-12	PCB (UNMOUNTED)			
		N09-0709-05	SCREW			
B-2	C001	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
B-2	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C004	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C-2	C005	CC45SL1H101J	CAP. CERAMIC	100P	5%	50V
C-2	C006	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
—	C007	NO USE				
B-1	C008	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
B-1	C009	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C011	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C-1	C012	CC45SL1H101J	CAP. CERAMIC	100P	5%	50V
C-1	C013	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
—	C014	NO USE				
B-3	C015	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
B-3	C016	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
B-3	C017	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
B-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C020	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C021	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C022	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C034	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
D-2	C035	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
B-1	D001	GMA-01	DIODE			
C-2	D002	1S1544A	DIODE			
B-2	D003	GMA-01	DIODE			
C-2	D004	1S1544A	DIODE			
D-3	D005	GMA-01	DIODE			
D-3	D006	GMA-01	DIODE			
D-3	D007	GMA-01	DIODE			
D-2	D008	GMA-01	DIODE			
D-1	D009	GMA-01	DIODE			
B-3	L001	L40-2201-03	FERRI INDUCTOR	22UH		
B-3	L002	L40-2201-03	FERRI INDUCTOR	22UH		
B-3	L003	L40-2201-03	FERRI INDUCTOR	22UH		
	P011	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P012	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P017	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P018	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P048	E40-1816-05	PIN CONNECTOR	18P		
	P054	E40-7414-05	PIN CONNECTOR	14P		
	P055	E40-7416-05	PIN CONNECTOR	16P		
	P056	E23-0503-05	TERMINAL			
	P057	NO USE				
	P058	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P059	NO USE				
	P060	E23-0503-05	TERMINAL			
	P061	E40-7416-05	PIN CONNECTOR	16P		
B-2	Q001	2SD438(F)	TR. SI, NPN			
C-2	Q002	DN1901	FET, DUAL SI, N-CHANNEL			
C-2	Q003	2SC3354(T,S)	TR. SI, NPN			
C-2	Q004	2SC3354(T,S)	TR. SI, NPN			
C-2	Q005	2SA1206	TR, SI, PNP			
C-2	Q006	2SA1206	TR, SI, PNP			
D-2	Q007	2SC2671(H)	TR. SI, NPN			
D-2	Q008	2SC2671(H)	TR. SI, NPN			
B-2	Q009	2SD438(F)	TR. SI, NPN			
C-1	Q010	DN1901	FET, DUAL SI, N-CHANNEL			
C-1	Q011	2SC3354(T,S)	TR. SI, NPN			
C-2	Q012	2SC3354(T,S)	TR. SI, NPN			
C-1	Q013	2SA1206	TR, SI, PNP			
C-1	Q014	2SA1206	TR, SI, PNP			
D-1	Q015	2SC2671(H)	TR. SI, NPN			
D-1	Q016	2SC2671(H)	TR. SI, NPN			
B-2	R001	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R002	RN14BK2E9003D	RES. METAL FILM	900K	0.5%	1/4W
B-2	R003	RN14BK2E1113D	RES. METAL FILM	111K	0.5%	1/4W
B-2	R004	RD14BB2C560J	RES. CARBON	56	5%	1/6W
B-2	R005	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
B-2	R006	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
B-7	R007	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
C-2	R008	RD14BB2C181J	RES. CARBON	180	5%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-2	R009	RD14BB2C181J	RES. CARBON	180	5%	1/6W
C-2	R010	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R011	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R012	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R013	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
C-2	R014	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
C-2	R015	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R016	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
C-2	R017	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
C-2	R018	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
C-2	R019	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
C-2	R020	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
C-2	R021	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
C-2	R022	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
C-2	R023	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R024	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R025	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R026	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
D-2	R027	RD14BB2C431J	RES. CARBON	430	5%	1/6W
D-2	R028	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R029	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-2	R030	RD14BB2C821J	RES. CARBON	820	5%	1/6W
D-2	R031	RD14BB2C330J	RES. CARBON	33	5%	1/6W
B-2	R032	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-1	R033	RN14BK2E9003D	RES. METAL FILM	900K	0.5%	1/4W
B-2	R034	RN14BK2E1113D	RES. METAL FILM	111K	0.5%	1/4W
B-2	R035	RD14BB2C560J	RES. CARBON	56	5%	1/6W
B-2	R036	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
B-2	R037	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
B-1	R038	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
C-1	R039	RD14BB2C181J	RES. CARBON	180	5%	1/6W
C-2	R040	RD14BB2C181J	RES. CARBON	180	5%	1/6W
C-1	R041	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R043	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R044	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
C-2	R045	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
C-1	R046	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R047	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
C-2	R048	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
C-1	R049	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
C-2	R050	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
C-1	R051	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
C-2	R052	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
C-2	R053	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
C-1	R054	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R055	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R056	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R057	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
D-2	R058	RD14BB2C431J	RES. CARBON	430	5%	1/6W
D-1	R059	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-1	R060	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R061	RD14BB2C821J	RES. CARBON	820	5%	1/6W
D-1	R062	RD14BB2C330J	RES. CARBON	33	5%	1/6W
D-1	R063	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-1	R064	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-1	R065	RD14BB2C391J	RES. CARBON	390	5%	1/6W
E-1	R066	RD14BB2C391J	RES. CARBON	390	5%	1/6W
E-1	R067	RD14BB2C391J	RES. CARBON	390	5%	1/6W
E-1	R068	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-2	R069	RD14BB2C391J	RES. CARBON	390	5%	1/6W
E-2	R070	RD14BB2C391J	RES. CARBON	390	5%	1/6W
E-2	R071	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-3	R072	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R073	RD14BB2C121J	RES. CARBON	120	5%	1/6W
B-1	R074	RD14BB2C121J	RES. CARBON	120	5%	1/6W
	R075	RD14BB2C470J	RES. CARBON	47	5%	1/6W
	R076	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-1	RL001	S51-2505-05	RELAY			
B-2	RL002	S51-2505-05	RELAY			
B-2	TC002	C05-0062-05	CAP. TRIMMER	6P		
B-2	TC003	C05-0031-15	CAP. TRIMMER	10P		
B-2	TC004	C05-0030-15	CAP. TRIMMER	20P		
—	TC005	NO USE				
B-1	TC006	C05-0062-05	CAP. TRIMMER	6P		
B-1	TC007	C05-0031-15	CAP. TRIMMER	10P		
B-1	TC008	C05-0030-15	CAP. TRIMMER	20P		
D-2	VR001	R12-0421-05	RES. SEMI FIXED	100 B		
D-2	VR002	R12-0421-05	RES. SEMI FIXED	100 B		

CPU UNIT

X81-1320-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		J25-5038-12	PCB (UNMOUNTED)			
B-4	C001	CE04W1A470M	CAP. ELECTRO	47	20%	10V
C-2	C002	CC45SL1H820J	CAP. CERAMIC	82P	5%	50V
D-2	C003	CE04W1H2R2M	CAP. ELECTRO	2.2	20%	50V
D-2	C004	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C-2	C005	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-3	D001	GMA01	DIODE			
D-2	D002	GMA01	DIODE			
D-1	D003	GMA01	DIODE			
D-2	D004	GMA01	DIODE			
C-2	IC001	MTM5010	MPU, 4-BIT MICROCOMPUTER			
B-2	IC002	AN90B20	IC, TR. ARRAY			
D-3	IC003	AN90B20	IC, TR. ARRAY			
	J001	E31-2429-05	LEAD WIRE WITH CONNECTOR			
	P002	E40-1274-05	PIN CONNECTOR			
	P049	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P061	E40-7516-05	PIN CONNECTOR	16P		
	P062	E40-7526-05	PIN CONNECTOR	26P		
C-4	Q001	2SA1309(Q,R)	TR. SI, PNP			
B-4	Q002	2SC3311(R)	TR. SI, NPN			
B-2	R001	RD14BB2C621J	RES. CARBON	620	5%	1/6W
B-3	R002	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-3	R003	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-3	R004	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-3	R005	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-3	R006	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-2	R007	RD14BB2C621J	RES. CARBON	620	5%	1/6W
B-3	R008	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-3	R009	RD14BB2C391J	RES. CARBON	390	5%	1/6W
C-2	R010	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
C-3	R011	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-3	R012	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-2	R013	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R014	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-3	R015	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-3	R016	RD14BB2C103J	RES. CARBON	10K	5%	1/6W

PARTS LIST

SWEEP ROTARY UNIT

X74-1310-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E31-2336-15	LEAD WIRE WITH CONNECTOR			
		F20-0640-04	INSULATOR			
		J25-2971-03	PCB (UNMOUNTED)			
		001-0004-05	COATING WIRE			
D-1	C001	CK45B1H103K	CAP. CERAMIC	0.01	10%	50V
D-2	C002	CK45B1H103K	CAP. CERAMIC	0.01	10%	50V
D-3	C003	CK45B1H103K	CAP. CERAMIC	0.01	10%	50V
D-3	C004	CK45B1H103K	CAP. CERAMIC	0.01	10%	50V
D-2	D001	GMA-01	DIODE			
D-2	D002	1SS135	DIODE			
D-2	D003	1SS135	DIODE			
E-2	D004	1SS135	DIODE			
E-2	D005	1SS135	DIODE			
E-2	D006	1SS135	DIODE			
F-2	D007	1SS135	DIODE			
F-2	D008	1SS135	DIODE			
D-3	D009	GMA-01	DIODE			
D-3	D010	1SS135	DIODE			
D-3	D011	1SS135	DIODE			
E-3	D012	1SS135	DIODE			
E-3	D013	1SS135	DIODE			
E-3	D014	1SS135	DIODE			
F-3	D015	1SS135	DIODE			
F-13	D016	1SS135	DIODE			
	P015	E40-0973-05	PIN CONNECTOR	9 CONTACT		
	P019	E40-1073-05	PIN CONNECTOR	10P		
	P040	E40-0873-05	PIN CONNECTOR	8 CONTACT		
	P041	E40-0873-05	PIN CONNECTOR	8 CONTACT		
	P042	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P051	E40-0773-05	PIN CONNECTOR	7P		
	P057	E40-0373-05	PIN CONNECTOR	3 CONTACT		
D-2	R001	RN14BK2B3603F	RES. METAL FILM	360K	1%	1/8W
D-2	R002	RN14BK2B1203F	RES. METAL FILM	120K	1%	1/8W
E-2	R003	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
E-2	R004	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
E-2	R005	RN14BK2B3602F	RES. METAL FILM	36K	1%	1/8W
E-2	R006	RN14BK2B1202F	RES. METAL FILM	12K	1%	1/8W
F-2	R007	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
F-2	R008	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
F-2	R009	RN14BK2B3601F	RES. METAL FILM	3.6K	1%	1/8W
D-2	R010	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
D-2	R011	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
E-2	R012	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
E-2	R013	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
E-2	R014	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
F-2	R015	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
F-2	R016	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
E-1	R017	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-1	R018	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R019	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-3	R020	RN14BK2B3603F	RES. METAL FILM	360K	1%	1/8W
D-3	R021	RN14BK2B1203F	RES. METAL FILM	120K	1%	1/8W
D-3	R022	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
E-3	R023	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
E-3	R024	RN14BK2B3602F	RES. METAL FILM	36K	1%	1/8W
E-3	R025	RN14BK2B1202F	RES. METAL FILM	12K	1%	1/8W
E-3	R026	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
F-3	R027	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
F-3	R028	RN14BK2B3601F	RES. METAL FILM	3.6K	1%	1/8W
D-4	R029	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
D-4	R030	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
E-4	R031	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
E-4	R032	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
E-4	R033	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
F-4	R034	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
F-3	R035	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
E-3	R036	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R037	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-3	R038	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
—	S001	S02-2503-05	ROTARY SWITCH			
—	S002	S02-2503-05	ROTARY SWITCH			
B-5	S003	S02-2503-05	ROTARY SWITCH			
B-5	S004	S02-2503-05	ROTARY SWITCH			
B-5	VR001	S02-2503-05	ROTARY SWITCH			

TRIG SWEEP UNIT

X74-1350-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E33-4046-00	WIRE ASSY			
		J25-5039-12	PCB (UNMOUNTED)			
		J61-0408-05	WIRE WRAPPING BAND			
		R92-0150-05	JUMPING RES.	ZERO OHM		
		212-1018-05	TUBE (PLASTIC)			
		212-2014-05	TUBE (PLASTIC)			
		420-0008-05	ADHESIVES			
A-1	C001	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
B-1	C002	CE04W1E100M	CAP. ELECTRO	10	20%	25V
B-1	C003	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C-2	C004	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C005	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-1	C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C007	CE04FW1V220M	CAP. ELECTRO	22	20%	35V
C-1	C008	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C009	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C012	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
D-1	C013	C91-0583-05	CAP. PLASTIC	10	10%	
C-2	C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C016	CQ93M1H333K	CAP. MYLAR	0.033	10%	50V
C-2	C017	C91-0584-05	CAP. CERAMIC	0.1	5%	
C-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C020	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
C-2	C021	C91-0581-05	CAP. CERAMIC	1000P	10%	
C-2	C022	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C023	CM93BD2A121J	CAP. MICA	120P	5%	100V
C-2	C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C025	CC45SL1H121J	CAP. CERAMIC	120P	5%	50V
B-2	C026	NO USE				
B-2	C027	C91-0549-05	CAP. TANTALUM	1	20%	35V
B-3	C028	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
C-3	C029	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
	C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-3	C031	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
B-3	C032	CE04W1E100M	CAP. ELECTRO	10	20%	25V
A-3	C033	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C-2	C034	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-3	C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C036	CE04FW1V220M	CAP. ELECTRO	22	20%	35V
C-3	C037	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-2	C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C039	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C040	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
D-3	C041	C91-0583-05	CAP. PLASTIC	10	10%	
C-2	C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C044	CQ93M1H333K	CAP. MYLAR	0.033	10%	50V
C-2	C045	C91-0584-05	CAP. CERAMIC	0.1	5%	
C-2	C046	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C048	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
C-2	C049	C91-0581-05	CAP. CERAMIC	1000P	10%	
C-2	C050	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C051	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C052	CC45SL1H121J	CAP. CERAMIC	120P	5%	50V
C-3	C053	CM93BD2A121J	CAP. MICA	120P	5%	100V
D-2	C054	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C055	CE04W1C330M	CAP. ELECTRO	33	20%	16V
	C056	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C057	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C058	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C059	CK45B1H681K	CAP. CERAMIC	680P	10%	50V
B-2	C060	CM93BD2A470J	CAP. MICA	47P	5%	100V
A-2	C061	CM93BD2A390J	CAP. MICA	39P	5%	100V
C-2	C062	CC45SL1H220J	CAP. CERAMIC	22P	5%	50V
B-2	C063	CQ93M1H102J	CAP. MYLAR	1000P	5%	50V
B-2	C064	CQ93M1H102J	CAP. MYLAR	1000P	5%	50V
B-2	C065	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
E-1	C066	CQ93M1H472J	CAP. MYLAR	4700P	5%	50V
E-1	C067	CQ93M1H472J	CAP. MYLAR	4700P	5%	50V
E-1	C068	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
E-1	C069	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
A-1	C070	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-3	C071	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-1	C072	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C-1	C073	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C-1	C074	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C-3	C075	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
E-3	C076	CE04W1C101M	CAP. ELECTRO	100	20%	16V
C-2	C077	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
E-3	C078	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-1	C079	CE04W1C330M	CAP. ELECTRO	33	20%	16V
E-3	C080	CE04W1C101M	CAP. ELECTRO	100	20%	16V
A-1	C081	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C082	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-3	C083	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C084	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C085	CE04W1A470M	CAP. ELECTRO	47	20%	10V
B-1	C086	CE04FW1A101M	CAP. ELECTRO	100	20%	10V

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
B-2	C087	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
B-3	C088	CE04FW1A101M	CAP. ELECTRO	100	20%	10V
E-3	C089	CE04W1A221M	CAP. ELECTRO	220	20%	10V
D-3	C090	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C091	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C092	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C093	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C094	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C095	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C096	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C097	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C098	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C099	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-3	C100	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-3	C101	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-3	C102	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
A-2	C103	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
E-1	C104	CE04W1E220M	CAP. ELECTRO	22	20%	25V
C-1	C105	CE04W1E220M	CAP. ELECTRO	22	20%	25V
C-3	C106	CE04W1E220M	CAP. ELECTRO	22	20%	25V
D-3	C107	CE04W1E101M	CAP. ELECTRO	100	20%	25V
E-3	C108	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C109	CE04FW1E330M	CAP. ELECTRO	33	20%	25V
D-1	C110	CE04W1J4R7M	CAP. ELECTRO	4.7	20%	63V
D-3	C111	CE04W1J100M	CAP. ELECTRO	10	20%	63V
D-3	C112	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-1	C113	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-3	C114	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
	C115	NO USE				
E-2	C116	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
	C117	CC45SL1H220J	CAP. CERAMIC	22P	5%	50V
	C118	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
B-1	D002	GMA-01	DIODE			
B-1	D003	GMA-01	DIODE			
B-1	D004	GMA-01	DIODE			
B-1	D005	MTZ3.0JB	DIODE, ZENER	3.0V		
B-1	D006	GMA-01	DIODE			
C-1	D007	DS442X	DIODE, SILICON	SWITCHING		
C-1	D008	GMA-01	DIODE			
C-1	D009	DS442X	DIODE, SILICON	SWITCHING		
C-1	D010	GMA-01	DIODE			
C-1	D011	GMA-01	DIODE			
D-1	D012	DS442X	DIODE, SILICON	SWITCHING		
D-1	D013	MTZ16JA	DIODE, ZENER	15V		
C-2	D014	GMA-01	DIODE			
D-3	D015	GMA-01	DIODE			
D-3	D016	GMA-01	DIODE			
C-1	D017	GMA-01	DIODE			
C-1	D018	GMA-01	DIODE			
B-2	D019	GMA-01	DIODE			
B-2	D020	GMA-01	DIODE			
B-2	D021	GMA-01	DIODE			
B-2	D022	NO USE				
D-2	D023	GMA-01	DIODE			
B-3	D024	GMA-01	DIODE			
A-3	D025	GMA-01	DIODE			
A-2	D026	GMA-01	DIODE			
A-3	D027	GMA-01	DIODE			
A-2	D028	GMA-01	DIODE			
A-3	D029	GMA-01	DIODE			
A-3	D030	GMA-01	DIODE			
—	D031	NO USE				
B-3	D032	GMA-01	DIODE			
A-3	D033	GMA-01	DIODE			
B-3	D034	GMA-01	DIODE			
B-3	D035	GMA-01	DIODE			
B-3	D036	GMA-01	DIODE			
C-3	D037	DS442X	DIODE, SILICON	SWITCHING		
C-3	D038	GMA-01	DIODE			
C-3	D039	DS442X	DIODE, SILICON	SWITCHING		
C-3	D040	GMA-01	DIODE			
C-3	D041	GMA-01	DIODE			
D-3	D042	DS442X	DIODE, SILICON	SWITCHING		
D-3	D043	MTZ16JA	DIODE, ZENER	15V		
B-3	D044	MTZ3.0JB	DIODE, ZENER	3.0V		
C-3	D045	GMA-01	DIODE			
C-2	D046	GMA-01	DIODE			
D-2	D047	GMA-01	DIODE			
D-2	D048	GMA-01	DIODE			
D-2	D049	GMA-01	DIODE			
D-2	D050	GMA-01	DIODE			
D-2	D051	GMA-01	DIODE			
B-1	D052	GMA-01	DIODE			
D-2	D053	MTZ12JC	DIODE, ZENER	12V		
D-2	D054	MTZ12JC	DIODE, ZENER	12V		
D-1	D055	SV06Y	DIODE			
	D056	GMA-01	DIODE			
D-1	D057	GMA-01	DIODE			
	D058	GMA-01	DIODE			
D-1	D059	GMA-01	DIODE			
D-1	D060	SV06Y	DIODE			
A-2	D061	GMA-01	DIODE			
A-3	D062	GMA-01	DIODE			
A-3	D063	GMA-01	DIODE			
A-3	D064	GMA-01	DIODE			
A-3	D065	GMA-01	DIODE			
B-2	D066	GMA-01	DIODE			

	REF.NO	PARTS NO	NAME & DESCRIPTION	
B-3	D067	GMA-01	DIODE	
B-3	D068	GMA-01	DIODE	
B-2	D069	GMA-01	DIODE	
	D070	NO USE		
E-1	D071	GMA-01	DIODE	
E-1	D072	GMA-01	DIODE	
E-1	D073	1N60	DIODE, GERMA	
B-1	IC001	MC10H103L	IC, QUAD 2-INPUT OR GATE	
B-1	IC002	MC10H131L	IC, DUAL D-FFS	
C-1	IC003	LF412CN	IC, DUAL JFET INPUT OP-AMP	
B-3	IC004	MC10H103L	IC, QUAD 2-INPUT OR GATE	
B-3	IC005	MC10H131L	IC, DUAL D-FFS	
C-3	IC006	LF412CN	IC, DUAL JFET INPUT OP-AMP	
B-1	IC007	MC10104L	IC, QUAD 2-INPUT AND GATE	
B-2	IC008	MC10103L	IC, QUAD 2-INPUT OR GATE	
B-2	IC009	MC10104L	IC, QUAD 2-INPUT AND GATE	
B-3	IC010	MC10104L	IC, QUAD 2-INPUT AND GATE	
B-2	IC011	MC10104L	IC, QUAD 2-INPUT AND GATE	
B-2	IC012	MC10102L	IC, QUAD 2-INPUT NOR GATE	
B-2	IC013	MC10131L	IC, DUAL D-FFS	
A-2	IC014	SN7406N	IC, HEX O.C.INVERTERS	
B-2	IC015	MC10104L	IC, QUAD 2-INPUT AND GATE	
E-2	IC016	MC78L05CP	VOLTAGE REGULATOR (5V, 100MA)	
C-2	IC017	MC78L15ACP	VOLTAGE REGULATOR (5V, 100MA)	
C-1	L001	L40-1001-01	FERRI INDUCTOR	10UH
C-3	L002	L40-1001-01	FERRI INDUCTOR	10UH
	L003	L40-2201-03	FERRI INDUCTOR	22UH
	P013	E40-0273-05	PIN CONNECTOR	2 CONTACT
	P014	E40-0773-05	PIN CONNECTOR	7P
	P028	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P035	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P036	E40-0673-05	PIN CONNECTOR	6 CONTACT
	P037	E40-0773-05	PIN CONNECTOR	7P
	P038	E40-0373-05	PIN CONNECTOR	3 CONTACT
	P039	E40-0773-05	PIN CONNECTOR	7P
	P040	E40-0873-05	PIN CONNECTOR	8 CONTACT
	P041	E40-0873-05	PIN CONNECTOR	8 CONTACT
	P042	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P043	E40-0273-05	PIN CONNECTOR	2 CONTACT
	P044	E40-0274-05	PIN CONNECTOR	2P
	P045	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P046	E40-0274-05	PIN CONNECTOR	2P
	P047	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P048	E40-1811-05	PIN CONNECTOR	18P
	P049	NO USE		
	P050	E40-0473-05	PIN CONNECTOR	4 CONTACT
	P051	NO USE		
	P052	E40-0273-05	PIN CONNECTOR	2 CONTACT
	P053	E40-0273-05	PIN CONNECTOR	2 CONTACT
	P057	E40-0373-05	PIN CONNECTOR	3 CONTACT
B-1	Q001	2SC3311(R)	TR. SI, NPN	
B-1	Q002	2SC3311(R)	TR. SI, NPN	
B-1	Q003	2SC3311(R)	TR. SI, NPN	
B-1	Q004	2SA1323(B)	TR. SI, PNP	
C-1	Q005	2SC3354(T,S)	TR. SI, NPN	
C-1	Q006	2SC1973(T)	TR. SI, NPN	
C-1	Q007	2SA1309(Q,R)	TR. SI, PNP	
D-1	Q008	2SD438(F)	TR. SI, NPN	
D-1	Q009	2SC3311(R)	TR. SI, NPN	
D-1	Q010	2SC3311(R)	TR. SI, NPN	
D-1	Q011	2SC3311(R)	TR. SI, NPN	
C-2	Q012	2SC3311(R)	TR. SI, NPN	
D-2	Q013	2SC3311(R)	TR. SI, NPN	
C-2	Q014	2SC3311(R)	TR. SI, NPN	
D-2	Q015	2SC3311(R)	TR. SI, NPN	
C-2	Q016	2SC3311(R)	TR. SI, NPN	
D-2	Q017	2SC3311(R)	TR. SI, NPN	
C-1	Q018	M47F(C)	FET, DUAL SI, N-CHANNEL	
C-1	Q019	2SC3315(C,D)	TR. SI, NPN	
C-2	Q020	2SA1309(Q,R)	TR. SI, PNP	
C-1	Q021	M47F(C)	FET, DUAL SI, N-CHANNEL	
C-1	Q022	2SC3315(C,D)	TR. SI, NPN	
C-2	Q023	2SC3311(R)	TR. SI, NPN	
B-1	Q024	2SC3311(R)	TR. SI, NPN	
B-1	Q025	2SC3311(R)	TR. SI, NPN	
B-1	Q026	2SC3311(R)	TR. SI, NPN	
B-2	Q027	2SA1323(B)	TR. SI, PNP	
B-2	Q028	2SA1323(B)	TR. SI, PNP	
D-2	Q029	2SA1323(B)	TR. SI, PNP	
D-2	Q030	2SA1323(B)	TR. SI, PNP	
A-3	Q031	2SC3311(R)	TR. SI, NPN	
A-3	Q032	2SC3311(R)	TR. SI, NPN	
A-3	Q033	2SC3311(R)	TR. SI, NPN	
B-3	Q034	2SA1323(B)	TR. SI, PNP	
C-3	Q035	2SC3354(T,S)	TR. SI, NPN	
C-3	Q036	2SC1973(T)	TR. SI, NPN	
C-3	Q037	2SA1309(Q,R)	TR. SI, PNP	
D-3	Q038	2SD438(F)	TR. SI, NPN	
D-3	Q039	2SC3311(R)	TR. SI, NPN	
D-3	Q040	2SC3311(R)	TR. SI, NPN	
D-3	Q041	2SC3311(R)	TR. SI, NPN	

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-2	Q042	2SC3311(R)	TR. SI, NPN			
D-2	Q043	2SC3311(R)	TR. SI, NPN			
C-2	Q044	2SC3311(R)	TR. SI, NPN			
D-2	Q045	2SC3311(R)	TR. SI, NPN			
C-2	Q046	2SC3311(R)	TR. SI, NPN			
D-2	Q047	2SC3311(R)	TR. SI, NPN			
C-3	Q048	M47F(C)	FET, DUAL SI, N-CHANNEL			
C-3	Q049	2SC3315(C,D)	TR. SI, NPN			
C-2	Q050	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q051	M47F(C)	FET, DUAL SI, N-CHANNEL			
C-2	Q052	2SC3315(C,D)	TR. SI, NPN			
E-2	Q053	2SC3311(R)	TR. SI, NPN			
E-2	Q054	2SC3311(R)	TR. SI, NPN			
D-2	Q055	2SC3315(C,D)	TR. SI, NPN			
D-2	Q056	2SC3315(C,D)	TR. SI, NPN			
D-2	Q057	2SC3315(C,D)	TR. SI, NPN			
D-2	Q058	2SC3315(C,D)	TR. SI, NPN			
D-2	Q059	2SC3315(C,D)	TR. SI, NPN			
D-2	Q060	2SC3315(C,D)	TR. SI, NPN			
D-2	Q061	2SC3315(C,D)	TR. SI, NPN			
D-2	Q062	2SA1239(F)	TR. SI, PNP-DUAL			
—	Q063	NO USE				
D-1	Q064	2SC3315(C,D)	TR. SI, NPN			
D-1	Q065	2SC3315(C,D)	TR. SI, NPN			
D-1	Q066	2SC3315(C,D)	TR. SI, NPN			
D-1	Q067	2SC3315(C,D)	TR. SI, NPN			
D-2	Q068	2SC3311(R)	TR. SI, NPN			
D-1	Q069	2SC3311(R)	TR. SI, NPN			
E-1	Q070	2SC3315(C,D)	TR. SI, NPN			
E-1	Q071	2SC3315(C,D)	TR. SI, NPN			
A-2	Q072	2SA1323(B)	TR. SI, PNP			
A-2	Q073	2SC3354(T,S)	TR. SI, NPN			
A-1	Q074	2SA1323(B)	TR. SI, PNP			
A-1	Q075	2SC3354(T,S)	TR. SI, NPN			
A-2	Q076	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q077	2SA1323(B)	TR. SI, PNP			
B-2	Q078	2SC3311(R)	TR. SI, NPN			
C-2	Q079	2SA1309(Q,R)	TR. SI, PNP			
E-1	Q080	2SA1309(Q,R)	TR. SI, PNP			
E-1	Q081	2SA1309(Q,R)	TR. SI, PNP			
E-1	Q082	2SA1309(Q,R)	TR. SI, PNP			
B-1	Q083	2SA1323(B)	TR. SI, PNP			
B-3	Q084	2SA1323(B)	TR. SI, PNP			
A-1	R001	RD14BB2C561J	RES. CARBON	560	5%	1/6W
A-1	R002	RD14BB2C470J	RES. CARBON	47	5%	1/6W
A-1	R003	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-1	R004	RD14BB2C511J	RES. CARBON	510	5%	1/6W
A-1	R005	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-1	R006	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R007	RD14BB2C751J	RES. CARBON	750	5%	1/6W
B-1	R008	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
B-1	R009	RD14BB2C751J	RES. CARBON	750	5%	1/6W
B-1	R010	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
B-1	R011	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R012	RD14BB2C181J	RES. CARBON	180	5%	1/6W
B-1	R013	RD14BB2C181J	RES. CARBON	180	5%	1/6W
B-1	R014	RD14BB2C181J	RES. CARBON	180	5%	1/6W
B-1	R015	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-1	R016	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
B-1	R017	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
A-1	R018	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
A-1	R019	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
B-1	R020	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R021	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R022	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-1	R023	RD14BB2C271J	RES. CARBON	270	5%	1/6W
B-1	R024	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R025	RD14BB2C271J	RES. CARBON	270	5%	1/6W
C-1	R026	RD14BB2C511J	RES. CARBON	510	5%	1/6W
C-1	R027	RD14BB2C361J	RES. CARBON	360	5%	1/6W
C-1	R028	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
C-1	R029	RD14BB2C100J	RES. CARBON	10	5%	1/6W
C-1	R030	NO USE				
C-1	R031	RD14BB2C511J	RES. CARBON	510	5%	1/6W
C-1	R032	RD14BB2C361J	RES. CARBON	360	5%	1/6W
C-1	R033	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R034	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
C-2	R035	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
C-1	R036	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
D-1	R037	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
D-1	R038	RN14BK2C2402F	RES. METAL FILM	24K	1%	1/6W
D-1	R039	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-1	R040	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
D-1	R041	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
D-1	R042	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-1	R043	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-1	R044	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-1	R045	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-1	R046	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R047	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R048	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R049	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R050	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R051	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R052	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-2	R053	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R054	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R055	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-1	R056	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R057	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R058	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R059	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R060	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R061	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
C-1	R062	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
C-2	R063	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R064	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-1	R065	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
B-2	R066	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-1	R067	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R068	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
C-2	R069	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-1	R070	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-1	R071	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R072	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R073	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R074	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	R075	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-1	R076	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R077	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-1	R078	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R079	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R080	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R081	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
C-2	R082	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
C-2	R083	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
C-2	R084	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
C-2	R085	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-2	R086	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-3	R087	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
C-3	R088	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
C-1	R089	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
C-1	R090	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R091	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
B-1	R092	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-1	R093	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-1	R094	RD14BB2C221J	RES. CARBON	220	5%	1/6W
B-2	R095	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R096	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R097	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-2	R098	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
B-3	R099	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
B-3	R100	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R101	RD14BB2C820J	RES. CARBON	82	5%	1/6W
B-2	R102	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-2	R103	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R104	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R105	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R106	RD14BB2C820J	RES. CARBON	82	5%	1/6W
B-2	R107	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-2	R108	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R109	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R110	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-3	R111	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R112	RD14BB2C181J	RES. CARBON	180	5%	1/6W
D-2	R113	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R114	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-2	R115	RD14BB2C331J	RES. CARBON	330	5%	1/6W
D-2	R116	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R117	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-2	R118	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-3	R119	RD14BB2C561J	RES. CARBON	560	5%	1/6W
A-3	R120	RD14BB2C470J	RES. CARBON	47	5%	1/6W
A-3	R121	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-3	R122	RD14BB2C511J	RES. CARBON	510	5%	1/6W
A-3	R123	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-3	R124	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R125	RD14BB2C751J	RES. CARBON	750	5%	1/6W
B-3	R126	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
B-3	R127	RD14BB2C751J	RES. CARBON	750	5%	1/6W
B-3	R128	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
B-3	R129	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-3	R130	RD14BB2C181J	RES. CARBON	180	5%	1/6W
A-3	R131	RD14BB2C181J	RES. CARBON	180	5%	1/6W
B-3	R132	RD14BB2C181J	RES. CARBON	180	5%	1/6W
A-3	R133	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
A-3	R134	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
A-3	R135	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-3	R136	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-3	R137	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R138	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R139	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-3	R140	RD14BB2C271J	RES. CARBON	270	5%	1/6W
C-3	R141	RD14BB2C271J	RES. CARBON	270	5%	1/6W
C-3	R142	RD14BB2C511J	RES. CARBON	510	5%	1/6W
C-3	R143	RD14BB2C361J	RES. CARBON	360	5%	1/6W
C-3	R144	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
C-3	R145	RD14BB2C100J	RES. CARBON	10	5%	1/6W
C-3	R146	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-3	R147	RD14BB2C511J	RES. CARBON	510	5%	1/6W
C-3	R148	RD14BB2C361J	RES. CARBON	360	5%	1/6W
C-3	R149	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R150	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
C-2	R151	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
C-3	R152	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
D-3	R153	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
D-3	R154	RN14BK2C2402F	RES. METAL FILM	24K	1%	1/6W
D-3	R155	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-3	R156	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
D-3	R157	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
D-3	R158	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-3	R159	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-3	R160	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-3	R161	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
D-3	R162	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R163	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R164	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R165	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R166	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R167	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R168	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-2	R169	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
C-2	R170	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R171	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-3	R172	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-3	R173	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R174	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R175	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-3	R176	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-3	R177	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
C-3	R178	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
C-3	R179	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
B-3	R180	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-1	R181	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
C-2	R182	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
C-2	R183	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
C-2	R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-3	R185	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R186	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R187	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R188	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R189	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R190	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R191	RD14BB2C511J	RES. CARBON	510	5%	1/6W
B-3	R192	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R193	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
E-2	R194	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
E-2	R195	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
E-2	R196	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R197	RD14BB2C751J	RES. CARBON	750	5%	1/6W
—	R198	NO USE				
E-2	R199	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
	R200	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-1	R201	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
E-2	R202	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-2	R203	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
E-2	R204	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-3	R205	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
D-2	R206	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
D-2	R207	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
D-2	R208	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
D-2	R209	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
D-2	R210	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
D-2	R211	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R212	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
D-2	R213	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
D-2	R214	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
D-2	R215	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
E-3	R216	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-2	R217	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
D-2	R218	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-2	R219	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
E-2	R220	RN14BK2C6201F	RES. METAL FILM	6.2K	1%	1/6W
	R221	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R222	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R223	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R224	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-2	R225	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
D-2	R226	RD14BB2C621J	RES. CARBON	620	5%	1/6W
D-2	R227	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
D-2	R228	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
D-2	R229	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
D-2	R230	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
D-1	R231	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-1	R232	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-1	R233	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
D-1	R234	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
D-1	R235	RN14BK2C1500F	RES. METAL FILM	150	1%	1/6W
D-1	R236	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
D-1	R237	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
E-1	R238	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-1	R239	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R240	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R241	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R242	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R243	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R244	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
E-1	R245	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-1	R246	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-1	R247	RD14BB2C470J	RES. CARBON	47	5%	1/6W
E-1	R248	RD14BB2C470J	RES. CARBON	47	5%	1/6W
A-2	R249	RD14BB2C911J	RES. CARBON	910	5%	1/6W
A-2	R250	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
A-2	R251	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R252	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R253	RD14BB2C471J	RES. CARBON	470	5%	1/6W
A-2	R254	RD14BB2C101J	RES. CARBON	100	5%	1/6W
A-2	R255	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-2	R256	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-2	R257	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
A-2	R258	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R259	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R260	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R261	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-1	R262	RD14BB2C471J	RES. CARBON	470	5%	1/6W
A-2	R263	RD14BB2C101J	RES. CARBON	100	5%	1/6W
A-1	R264	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-1	R265	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-1	R266	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
A-2	R267	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R268	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R269	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R270	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R271	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R272	RD14BB2C331J	RES. CARBON	330	5%	1/6W
A-2	R273	RD14BB2C331J	RES. CARBON	330	5%	1/6W
E-2	R274	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R275	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
A-2	R276	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
A-2	R277	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R278	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R279	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R280	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-2	R281	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
A-3	R282	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-3	R283	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
A-3	R284	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
A-2	R285	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
B-3	R286	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R287	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R288	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R289	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R290	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-2	R291	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R292	RD14BB2C301J	RES. CARBON	300	5%	1/6W
C-2	R293	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R294	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
B-2	R295	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
B-2	R296	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R297	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
B-2	R298	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-2	R299	RD14BB2C2R7J	RES. CARBON	2.7	5%	1/6W
A-2	R300	RD14BB2C331J	RES. CARBON	330	5%	1/6W
E-1	R301	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
E-1	R302	RN14BK2C9102F	RES. METAL FILM	91K	1%	1/6W
E-1	R303	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
E-1	R304	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
E-1	R305	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
E-1	R306	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
E-1	R307	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
E-1	R308	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
C-2	R309	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-3	R310	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
E-2	R311	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-2	R312	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-1	R313	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R314	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R315	RD14BB2C391J	RES. CARBON	390	5%	1/6W
D-1	R316	RD14BB2C391J	RES. CARBON	390	5%	1/6W
B-1	R317	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R318	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-1	R319	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	R320	RD14BB2C331J	RES. CARBON	330	5%	1/6W
B-3	R321	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R322	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-3	R323	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R324	RD14BB2C331J	RES. CARBON	330	5%	1/6W
	R325	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
	R326	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
	R327	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-1	TC001	C05-0309-05	CAP. TRIMMER	40P		
C-3	TC002	C05-0309-05	CAP. TRIMMER	40P		
C-1	TC003	C05-0062-05	CAP. TRIMMER	6P		
C-3	TC004	C05-0062-05	CAP. TRIMMER	6P		
E-1	TP001	E40-0211-05	PIN CONNECTOR	2P		
D-1	VR001	R12-3520-05	RES. SEMI FIXED	10K B		
D-1	VR002	R12-2512-05	RES. SEMI FIXED	5K B		
D-3	VR003	R12-3520-05	RES. SEMI FIXED	10K B		
D-3	VR004	R12-2512-05	RES. SEMI FIXED	5K B		
B-2	VR005	R12-0539-05	RES. SEMI FIXED	200 B		
B-2	VR006	R12-2512-05	RES. SEMI FIXED	5K B		
C-1	VR007	R12-1517-05	RES. SEMI FIXED	1K B		
C-3	VR008	R12-1517-05	RES. SEMI FIXED	1K B		
D-2	VR009	R12-2512-05	RES. SEMI FIXED	5K B		
D-2	VR010	R12-2512-05	RES. SEMI FIXED	5K B		
D-2	VR011	R12-1518-05	RES. SEMI FIXED	2K B		
D-2	VR012	R12-1518-05	RES. SEMI FIXED	2K B		
D-1	VR013	R12-0421-05	RES. SEMI FIXED	100 B		

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION
D-1	VR014	R12-0540-05	RES. SEMI FIXED 500 B
D-2	VR015	R12-3520-05	RES. SEMI FIXED 10K B
E-1	VR016	R12-5516-05	RES. SEMI FIXED 100K OHM B
E-1	VR017	R12-0539-05	RES. SEMI FIXED 200 B

HORIZONTAL OUTPUT AMP UNIT

X74-1360-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E23-0512-05	TERMINAL			
		F01-0827-04	HEAT SINK			
		J25-5039-12	PCB (UNMOUNTED)			
		J30-0605-05	SPACER			
C-2	C001	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-1	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C004	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-1	C006	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
D-1	C007	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C-3	C008	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
D-3	C009	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
	C011	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
E-2	C012	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-2	C013	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
E-2	C014	C91-0549-05	CAP. TANTALUM	1	20%	35V
E-2	C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C016	C91-0549-05	CAP. TANTALUM	1	20%	35V
F-2	C017	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
B-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C019	CE04W1C101M	CAP. ELECTRO	100	20%	16V
B-2	C020	CE04W1C101M	CAP. ELECTRO	100	20%	16V
B-2	C021	CE04W2A100M	CAP. ELECTRO	10	20%	100V
B-1	C022	CE04W2C2R2	CAP. ELECTRO	2.2		160V
D-2	C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C024	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
E-2	D001	DS442X	DIODE, SILICON	SWITCHING		
E-2	D002	MTZ5.1JB	DIODE, ZENER	5V		
B-1	L001	L40-1011-04	FERRI INDUCTOR	100UH		
B-2	L002	L40-1011-04	FERRI INDUCTOR	100UH		
B-2	L003	L40-1011-04	FERRI INDUCTOR	100UH		
B-2	L004	L40-1011-04	FERRI INDUCTOR	100UH		
	P027	E40-0873-05	PIN CONNECTOR	8 CONTACT		
	P035	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P036	E40-0673-05	PIN CONNECTOR	6 CONTACT		
C-2	Q001	2SA1323(B)	TR. SI, PNP			
C-2	Q002	2SA1323(B)	TR. SI, PNP			
D-1	Q003	2SA1323(B)	TR. SI, PNP			
D-2	Q004	2SA1323(B)	TR. SI, PNP			
D-1	Q005	2SC805A-2(2,3)	TR. SI, NPN			
D-3	Q006	2SC805A-2(2,3)	TR. SI, NPN			
E-1	Q007	2SA923-2(2,3)	TR. SI, PNP			
E-3	Q008	2SA923-2(2,3)	TR. SI, PNP			
B-2	Q009	2SC3311(R)	TR. SI, NPN			
B-2	Q010	2SC3311(R)	TR. SI, NPN			
B-2	Q011	2SC3311(R)	TR. SI, NPN			
C-1	R001	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
C-3	R002	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
C-1	R003	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R004	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R005	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
C-2	R006	RD14BY2H473J	RES. CARBON	47K	5%	1/2W
C-2	R007	RD14BY2H473J	RES. CARBON	47K	5%	1/2W
D-2	R008	RD14BB2C821J	RES. CARBON	820	5%	1/6W
D-2	R009	RD14BB2C821J	RES. CARBON	820	5%	1/6W
D-1	R010	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-2	R011	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-1	R012	RS14GB3A223J	RES. METAL FILM	22K	5%	1W
D-3	R013	RS14GB3A223J	RES. METAL FILM	22K	5%	1W
C-1	R014	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
C-3	R015	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
E-2	R016	RD14BY2H123J	RES. CARBON	12K	5%	1/2W
E-2	R017	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-2	R018	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-1	R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-3	R020	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-2	R021	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R022	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-2	R023	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-2	R024	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R025	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R026	RD14BB2C271J	RES. CARBON	270	5%	1/6W
B-2	R027	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W

PARTS LIST

A TRIG SWITCH UNIT

X77-1280-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		J25-5039-12	PCB (UNMOUNTED)			
		L92-0110-05	BEAD CORE			
A-2	C001	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
B-2	C002	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
B-3	C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
B-3	C004	CE04W1E100M	CAP. ELECTRO	10	20%	25V
B-3	C005	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C-3	C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C007	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
D-4	C008	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
E-3	C009	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
—	C012	NO USE				
E-3	C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C014	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C015	CE04W1C330M	CAP. ELECTRO	33	20%	16V
	C016	NO USE				
C-2	C017	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
D-1	C018	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-2	C019	CE04W1H010M	CAP. ELECTRO	1	20%	50V
D-2	C020	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
E-2	C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V
E-2	C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V
E-2	C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V
E-2	C024	CE04W1C330M	CAP. ELECTRO	33	20%	16V
—	C025	NO USE				
E-2	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-3	C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-4	C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C036	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C037	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
—	C043	NO USE				
D-2	C044	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C045	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
—	C046	NO USE				
B-2	C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-1	C048	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C049	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
C-2	D001	SV03Y	DIODE			
C-2	D002	GMA01	DIODE			
C-2	D003	GMA01	DIODE			
C-1	D004	MTZ16JA	DIODE, ZENER	15V		
D-1	D005	GMA01	DIODE			
D-1	D006	GMA01	DIODE			
D-1	D007	GMA01	DIODE			
D-1	D008	GMA01	DIODE			
D-2	D009	SV04Y	DIODE			
E-2	L001	L40-1011-03	FERRI INDUCTOR	100UH		
E-2	L002	L40-1011-03	FERRI INDUCTOR	100UH		
	P024	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P046	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P047	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P059	E40-0973-05	PIN CONNECTOR	9 CONTACT		
B-4	Q001	2SJ43(Q)	FET. P-CHANNEL			
B-4	Q002	2SK127(Q)	FET,			
C-3	Q003	DN1901	FET, DUAL SI, N-CHANNEL			
D-3	Q004	2SC3354(T,S)	TR. SI, NPN			
D-3	Q005	2SC3354(T,S)	TR. SI, NPN			
D-3	Q006	2SA1161	TR. SI, PNP			
D-3	Q007	2SA1161	TR. SI, PNP			
E-3	Q008	2SA1309(Q,R)	TR. SI, PNP			
E-3	Q009	2SC3066	TR. SI, NPN			
D-3	Q010	2SC2671(H)	TR. SI, NPN			
D-3	Q011	2SC2671(H)	TR. SI, NPN			
D-3	Q012	2SC3354(T,S)	TR. SI, NPN			
D-3	Q013	2SC3354(T,S)	TR. SI, NPN			
D-2	Q014	2SC3354(T,S)	TR. SI, NPN			
D-3	Q015	2SC3354(T,S)	TR. SI, NPN			
C-2	Q016	2SC2671(H)	TR. SI, NPN			
B-2	Q017	2SC3311(R)	TR. SI, NPN			
C-1	Q018	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q019	2SK30A(O)	FET. N-CHANNEL			
C-2	Q020	2SC3311(R)	TR. SI, NPN			
D-1	Q021	2SA1309(Q,R)	TR. SI, PNP			
D-2	Q022	2SC3311(R)	TR. SI, NPN			
D-2	Q023	2SA1309(Q,R)	TR. SI, PNP			
D-2	Q024	2SK30A(O)	FET. N-CHANNEL			
D-2	Q025	2SA1309(Q,R)	TR. SI, PNP			
B-2	R001	RD14BB2C510J	RES. CARBON	51	5%	1/6W
A-2	R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W
A-1	R003	RD14BB2C101J	RES. CARBON	100	5%	1/6W
A-2	R004	RD14BB2C510J	RES. CARBON	51	5%	1/6W
B-1	R005	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-2	R006	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-3	R007	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-4	R008	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-4	R009	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
B-4	R010	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
C-3	R011	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
B-4	R012	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
B-3	R013	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
C-3	R014	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-3	R015	RD14BB2C431J	RES. CARBON	430	5%	1/6W
C-3	R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R017	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-3	R018	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
C-3	R019	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
C-3	R020	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
C-3	R021	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
C-3	R022	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R023	RD149B2C220J	RES. CARBON	22	5%	1/6W
D-3	R024	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
D-3	R025	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
D-3	R026	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-3	R027	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
D-3	R028	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
D-4	R029	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-2	R030	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
D-3	R031	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
D-3	R032	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
D-3	R033	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
D-3	R034	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R035	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R036	RD14BB2C151J	RES. CARBON	150	5%	1/6W
E-3	R037	RD14BB2C681J	RES. CARBON	680	5%	1/6W
E-3	R038	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
E-3	R039	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
D-2	R040	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
D-2	R041	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
E-4	R042	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
D-4	R043	RD14BB2C161J	RES. CARBON	160	5%	1/6W
D-3	R044	RD149B2C131J	RES. CARBON	130	5%	1/6W
D-3	R045	RD14BB2C131J	RES. CARBON	130	5%	1/6W
E-3	R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-2	R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W
E-3	R048	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
E-3	R049	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
D-3	R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R051	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-2	R052	RD14BB2C561J	RES. CARBON	560	5%	1/6W
D-2	R053	RD14BB2C561J	RES. CARBON	560	5%	1/6W
C-2	R054	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R055	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R056	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
B-2	R057	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
B-1	R058	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
B-1	R059	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
C-1	R060	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
C-2	R061	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
C-1	R062	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-1	R063	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-2	R064	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R065	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
C-1	R066	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
D-1	R067	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
D-2	R068	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
D-1	R069	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
D-2	R070	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
D-2	R071	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
D-2	R072	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
C-2	R073	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
B-1	R074	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
E-3	R075	RD14BB2C221J	RES. CARBON	220	5%	1/6W
	S001	S33-2504-05	LEVER SWITCH			
	S002	S32-4008-05	LEVER SWITCH			
E-4	TC001	C05-0412-05	CAP. TRIMMER	20P		
B-3	VR001	R01-5502-05	V.R.	100K B		
C-4	VR002	R12-3522-05	RES. SEMI FIXED	10K B		
D-4	VR003	R12-1519-05	RES. SEMI FIXED	1K B		
E-3	VR004	R12-1520-05	RES. SEMI FIXED	2KB		

PARTS LIST

B TRIG SWITCH UNIT

X77-1290-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		J25-5023-04	PCB (UNMOUNTED)			
		J61-0506-05	BOARD SUPPORT			
		L92-0110-05	BEAD CORE			
		212-2014-05	TUBE (PLASTIC)			
C-2	C001	CE04W1C100M	CAP. ELECTRO	10	20%	16V
D-2	C002	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
D-2	C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
D-2	C004	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
D-3	C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C007	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C-2	C008	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C-2	C009	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C010	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C012	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-3	C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C017	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
A-3	C018	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-3	C019	CE04W1C330M	CAP. ELECTRO	33	20%	16V
D-3	C020	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-3	C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-3	C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V
D-3	C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V
A-2	C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C025	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-2	C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
A-3	C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
	C036	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
	C037	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C-2	D001	MTZ8.2JB	DIODE, ZENER	8.1V		
A-2	D002	SV03Y	DIODE			
	D003	SV04Y	DIODE			
A-3	L001	L40-2201-03	FERRI INDUCTOR	22UH		
A-3	L002	L40-2201-03	FERRI INDUCTOR	22UH		
	P043	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P044	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P045	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P051	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P058	E40-0273-05	PIN CONNECTOR	2 CONTACT		
C-2	Q001	2SC3354(T,S)	TR. SI, NPN			
C-3	Q002	DN1901	FET, DUAL SI, N-CHANNEL			
C-3	Q003	2SC3354(T,S)	TR. SI, NPN			
C-2	Q004	2SC3354(T,S)	TR. SI, NPN			
C-3	Q005	2SA1161	TR. SI, PNP			
C-2	Q006	2SA1161	TR. SI, PNP			
C-2	Q007	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q008	2SC3066	TR. SI, NPN			
B-3	Q009	2SC2671(H)	TR. SI, NPN			
B-2	Q010	2SC2671(H)	TR. SI, NPN			
B-3	Q011	2SC3354(T,S)	TR. SI, NPN			
B-3	Q012	2SC3354(T,S)	TR. SI, NPN			
B-2	Q013	2SC3354(T,S)	TR. SI, NPN			
B-2	Q014	2SC3354(T,S)	TR. SI, NPN			
B-2	Q015	2SC2671(H)	TR. SI, NPN			
C-1	R001	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-2	R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R003	RD14BB2C510J	RES. CARBON	51	5%	1/6W
C-2	R004	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
C-2	R005	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R006	RD14BB2C821J	RES. CARBON	820	5%	1/6W
D-2	R007	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-2	R008	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
D-2	R009	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
D-3	R010	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
D-3	R011	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
D-3	R012	RD14BB2C431J	RES. CARBON	430	5%	1/6W
D-3	R013	RD14BB2C220J	RES. CARBON	22	5%	1/6W
D-3	R014	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-3	R015	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
C-3	R016	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
C-3	R017	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
C-3	R018	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R020	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-3	R021	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-3	R022	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-3	R023	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
C-2	R024	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
C-2	R025	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-3	R026	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
C-2	R027	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
C-3	R028	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
C-3	R029	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
C-2	R030	RD14BB2C151J	RES. CARBON	150	5%	1/6W
C-2	R031	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R032	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R033	RD14BB2C681J	RES. CARBON	680	5%	1/6W
C-2	R034	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
C-2	R035	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
A-2	R036	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
B-2	R037	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-2	R038	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
B-3	R039	RD14BB2C161J	RES. CARBON	160	5%	1/6W
B-3	R040	RD14BB2C131J	RES. CARBON	130	5%	1/6W
B-3	R041	RD14BB2C131J	RES. CARBON	130	5%	1/6W
B-3	R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R043	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-3	R044	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-3	R045	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-3	R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R048	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-2	R049	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-2	R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R051	RD14BB2C470J	RES. CARBON	47	5%	1/6W
	S001	S37-2005-05	LEVER SWITCH			
	S002	S37-2005-05	LEVER SWITCH			
B-3	TC001	C05-0412-05	CAP. TRIMMER	20P		
D-3	VR001	R01-5503-05	V.R.	100KB		
D-3	VR002	R12-3522-05	RES. SEMI FIXED	10K B		
C-2	VR003	R12-1520-05	RES. SEMI FIXED	2KB		

PARTS LIST

POWER BLANKING UNIT

X68-1400-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E31-0762-05	LEAD WIRE WITH CONNECTOR			
		E33-0965-00	WIRE ASSY			
		F02-0414-05	HEAT SINK			
		F02-0503-14	HEAT SINK			
		F09-0506-05	PROTECTION COVER			
		F15-0727-04	HOLDER (NEON TUBE)			
		F20-0516-05	INSULATOR			
		F20-0623-05	INSULATOR			
		J21-2930-14	BRACKET FOR VR			
		J25-5038-12	PCB (UNMOUNTED)			
		J30-0605-05	SPACER			
		N09-0167-05	SCREW			
		N09-0711-05	SCREW			
		212-1018-05	TUBE (PLASTIC)			
		212-3017-05	TUBE (PLASTIC)			
B-2	C001	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C003	CE04W1V100M	CAP. ELECTRO	10	20%	35V
C-4	C004	CE04W1J330M	CAP. ELECTRO	33	20%	63V
B-3	C005	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C-3	C006	CE04W2C3R3	CAP. ELECTRO	3.3		160V
B-3	C007	CE04W1C330M	CAP. ELECTRO	33	20%	16V
B-2	C008	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-3	C009	CE04W1E101M	CAP. ELECTRO	100	20%	25V
B-2	C010	CE04W1E101M	CAP. ELECTRO	100	20%	25V
B-3	C011	CE04W1A221M	CAP. ELECTRO	220	20%	10V
B-4	C012	CE04W1V100M	CAP. ELECTRO	10	20%	35V
B-4	C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-4	C014	CE04W1V470M	CAP. ELECTRO	47	20%	35V
A-2	C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-4	C017	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
D-4	C018	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
D-4	C019	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-4	C020	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-4	C021	C91-0549-05	CAP. TANTALUM	1	20%	35V
D-4	C022	C91-0549-05	CAP. TANTALUM	1	20%	35V
C-4	C023	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D-3	C024	CC45CH2H0R5C	CAP. CERAMIC	0.5P	0.25P	500V
C-3	C025	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C-3	C026	C91-0549-05	CAP. TANTALUM	1	20%	35V
D-3	C027	CC45CH2H030C	CAP. CERAMIC	3P	0.25P	500V
D-3	C028	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-2	C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C030	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C-2	C031	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C-3	C032	CE04W1A221M	CAP. ELECTRO	220	20%	10V
C-3	C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C034	CE04W1E101M	CAP. ELECTRO	100	20%	25V
C-3	C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-2	C036	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C-2	C037	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
D-2	C038	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
D-2	C039	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C-1	C040	CK45E3F102P	CAP. CERAMIC	1000P		3.1K
B-1	C041	CQ93M1H154K	CAP. MYLAR	0.15	10%	50V
B-1	C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C044	CE04W1E470M	CAP. ELECTRO	47	20%	25V
B-2	C045	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C046	CE04W1E470M	CAP. ELECTRO	47	20%	25V
B-1	C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-1	C048	CE04W1E470M	CAP. ELECTRO	47	20%	25V
B-1	C049	CQ93M1H472K	CAP. MYLAR	4700P	10%	50V
B-2	C050	CE04W1E470M	CAP. ELECTRO	47	20%	25V
B-2	C051	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-1	C052	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C-1	C053	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
D-1	C054	CK45E3D102P	CAP. CERAMIC	1000P		2K
B-2	C055	CK45B2H222K	CAP. CERAMIC	2200P	10%	500V
D-3	C059	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C060	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C061	CE04W1C470M	CAP. ELECTRO	47	20%	16V
B-3	D001	DS442X	DIODE, SILICON	SWITCHING		
B-3	D002	MTZ12JC	DIODE, ZENER	12V		
B-2	D003	MTZ12JC	DIODE, ZENER	12V		
D-3	D004	MTZ3.3JA	DIODE, ZENER	3.2V		
D-3	D005	DS442X	DIODE, SILICON	SWITCHING		
C-3	D008	DS442X	DIODE, SILICON	SWITCHING		
C-4	D009	MTZ5.1JB	DIODE, ZENER	5V		
C-2	D010	1SS83	DIODE, SILICON	SWITCHING		
D-2	D011	1SS83	DIODE, SILICON	SWITCHING		
C-2	D012	W06C	DIODE, SILICON	RECTIFIER		
C-2	D013	W06C	DIODE, SILICON	RECTIFIER		
D-2	D014	W06C	DIODE, SILICON	RECTIFIER		
D-2	D015	W06C	DIODE, SILICON	RECTIFIER		
B-1	D016	DS442X	DIODE, SILICON	SWITCHING		
B-1	D017	DS442X	DIODE, SILICON	SWITCHING		
B-1	D018	MTZ3.3JA	DIODE, ZENER	3.2V		
B-1	D019	MTZ6.2JB	DIODE, ZENER	6.1V		
B-1	D020	DS442X	DIODE, SILICON	SWITCHING		
B-3	IC001	NJM4558D	IC, DUAL OP-AMP			
B-3	IC002	NJM4558D	IC, DUAL OP-AMP			
B-2	IC003	LM340LAZ5.0	IC,RUGULATOR			
B-4	L001	L40-1011-04	FERRI INDUCTOR	100UH		
B-4	L002	L40-1011-04	FERRI INDUCTOR	100UH		
C-3	L003	L40-1011-04	FERRI INDUCTOR	100UH		
C-3	L004	L40-1011-04	FERRI INDUCTOR	100UH		
C-3	L005	L40-1011-04	FERRI INDUCTOR	100UH		
C-2	L006	L40-1011-03	FERRI INDUCTOR	100UH		
B-1	L007	L40-1011-04	FERRI INDUCTOR	100UH		
B-2	L008	L40-1011-04	FERRI INDUCTOR	100UH		
C-1	NL001	NE-2B	NEON LAMP			
C-1	NL002	NE-2B	NEON LAMP			
D-1	NL003	NE-2B	NEON LAMP			
D-1	NL004	NE-2B	NEON LAMP			
	P022	E40-0773-05	PIN CONNECTOR	7P		
	P023	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P024	NO USE				
	P025	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P026	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P027	E40-0873-05	PIN CONNECTOR	8 CONTACT		
	P028	E40-0473-05	PIN CONNECTOR	4 CONTACT		
	P029	E40-0703-05	PIN CONNECTOR	7P		
	P030	E40-0746-05	PIN CONNECTOR	7P		
	P031	NO USE				
	P032	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P033	E40-0332-05	PIN CONNECTOR	3 CONTACT		
	P034	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P063	E40-0673-05	PIN CONNECTOR	6 CONTACT		
D-3	PL001	B30-0927-15	LAMP			
D-3	PL002	B30-0927-15	LAMP			
D-3	PL003	B30-0927-15	LAMP			
D-3	PL004	B30-0927-15	LAMP			
B-3	Q001	2SC2591(Q,R)	TR. SI, NPN			
B-3	Q002	2SC1505(L)	TR. SI, NPN			
B-3	Q003	2SB633(E)	TR. SI, PNP			
B-2	Q004	2SD613(E)	TR. SI, NPN			
B-3	Q005	2SB633(E)	TR. SI, PNP			
B-4	Q006	2SC1505(L)	TR. SI, NPN			
B-4	Q007	2SC3311(R)	TR. SI, NPN			
B-2	Q008	2SC1505(L)	TR. SI, NPN			
B-2	Q009	2SC3311(R)	TR. SI, NPN			
B-2	Q010	2SA1309(Q,R)	TR. SI, PNP			
D-3	Q011	2SC3354(T,S)	TR. SI, NPN			
D-3	Q012	2SC3354(T,S)	TR. SI, NPN			
D-3	Q013	2SA1323(B)	TR. SI, PNP			
C-3	Q014	2SC3311(R)	TR. SI, NPN			
C-4	Q015	2SC3315(C,D)	TR. SI, NPN			
D-3	Q016	2SC3315(C,D)	TR. SI, NPN			
C-3	Q017	2SC3315(C,D)	TR. SI, NPN			
D-2	Q018	2SC805A-2(2,3)	TR. SI, NPN			
C-2	Q019	2SA923-2(2,3)	TR. SI, PNP			
D-3	Q020	2SC2910(S,T)	TR. SI, NPN			
D-3	Q021	2SA1208(S,T)	TR. SI, PNP			
C-2	Q022	2SC2910(S,T)	TR. SI, NPN			
C-2	Q023	2SC2910(S,T)	TR. SI, NPN			
B-1	Q024	2SC3311(R)	TR. SI, NPN			
B-1	Q025	2SC3311(R)	TR. SI, NPN			
B-1	Q026	2SA1309(Q,R)	TR. SI, PNP			
B-1	Q027	2SK192A-BL	FET, N-CHANNEL			
B-1	Q028	2SD613(E)	TR. SI, NPN			
B-2	R001	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
B-3	R002	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R003	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
B-3	R004	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R005	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-3	R006	RN14BK2C1303F	RES. METAL FILM	130K	1%	1/6W
B-3	R007	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
B-3	R008	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-3	R009	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
B-3	R010	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
B-3	R011	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
B-3	R012	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
B-13	R013	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
B-2	R014	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-2	R015	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
B-2	R016	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
B-3	R017	RD14BB2C561J	RES. CARBON	560	5%	1/6W
B-3	R018	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
B-3	R019	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
B-3	R020	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
A-4	R021	RD14BB2E100J	RES. CARBON	10	5%	1/4W
B-4	R022	RN14BK2C1302F	RES. METAL FILM	13K	1%	1/6W
B-4	R023	RN14BK2C8201F	RES. METAL FILM	8.2K	1%	1/6W
C-3	R024	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
C-3	R025	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
C-3	R026	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
C-3	R027	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-4	R028	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-4	R029	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
C-4	R030	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
D-3	R031	RD14BB2C681J	RES. CARBON	680	5%	1/6W
C-4	R032	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
C-4	R033	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
D-4	R034	RD14BB2C510J	RES. CARBON	51	5%	1/6W
D-4	R035	RD14BB2C510J	RES. CARBON	51	5%	1/6W
D-4	R036	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-4	R037	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-4	R038	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
E-4	R039	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-4	R040	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-3	R041	RD14BB2E751J	RES. CARBON	750	5%	1/4W
D-3	R042	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
—	R043	NO USE				
D-3	R044	RD14BB2C361J	RES. CARBON	360	5%	1/6W
D-3	R045	RD14BB2C221J	RES. CARBON	220	5%	1/6W
D-3	R046	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
C-3	R047	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
C-3	R048	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
D-3	R049	RD14BB2C753J	RES. CARBON	75K	5%	1/6W
C-3	R050	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
C-3	R051	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
C-3	R052	RD14BB2C561J	RES. CARBON	560	5%	1/6W
D-2	R053	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-3	R054	RD14BB2C244J	RES. CARBON	240K	5%	1/6W
D-3	R055	RD14BB2C221J	RES. CARBON	220	5%	1/6W
D-3	R056	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
D-3	R057	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
D-2	R058	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
D-2	R059	RD14BB2C470J	RES. CARBON	47	5%	1/6W
D-2	R060	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
D-2	R061	RD14BB2C561J	RES. CARBON	560	5%	1/6W
C-2	R062	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
C-2	R063	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
C-2	R064	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R065	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-2	R066	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
C-2	R067	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
C-1	R068	RN14BK2C6202F	RES. METAL FILM	62K	1%	1/6W
B-1	R069	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-1	R070	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-1	R071	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
B-1	R072	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
A-1	R073	RD14BB2C680J	RES. CARBON	68	5%	1/6W
C-2	R074	R92-0793-05	RES. FIXED	15M	5%	1/2W
D-1	R075	R92-1050-05	RES. FIXED	5.1M	5%	1/2W
D-2	R076	R92-1051-05	RES. FIXED	4.7M	5%	1W
D-1	R077	R92-1052-05	RES. FIXED	4.3M	5%	1W
D-1	R078	R92-0755-05	RES. FIXED	3M	5%	1/2W
C-1	R079	R92-0756-05	RES. FIXED	47M	5%	1/2W
A-3	R080	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
A-3	R081	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
A-2	R082	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
C-2	R083	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
E-4	R084	RD14BB2C221J	RES. CARBON	220	5%	1/6W
C-4	R091	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-4	TC001	C05-0405-05	CAP. TRIMMER	20P		
D-3	TC002	C05-0405-05	CAP. TRIMMER	20P		
D-3	TC003	C05-0438-05	CAP. TRIMMER	2P		
C-3	VR001	R12-1028-05	RES. SEMI FIXED	4.7K B		
D-3	VR002	R12-3041-05	RES. SEMI FIXED	10K B		
C-1	VR003	R12-3042-05	RES. SEMI FIXED	47K B		
E-1	VR004	R05-8001-05	V.R.	3M B		
—	VR005	R03-3502-15	V.R.	10K B		
E-3	VR006	R23-1501-05	V.R.	1K B		

FILTER UNIT

X70-1020-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E18-0351-05	INLET	3P		
		E23-0503-05	TERMINAL			
		J25-5038-12	PCB (UNMOUNTED)			
C-3	C001	C91-0551-05	CAP. POLYESTER	0.22	10%	630V
C-3	C002	C91-0575-05	CAP. CERAMIC	1000P		630
B-3	C003	C91-0575-05	CAP. CERAMIC	1000P		630
A-3	C004	CE04W1H010M	CAP. ELECTRO	1	20%	50V
A-3	D001	GMA01	DIODE			
A-2	IC001	DN3101	PHOTO COUPLER			
C-2	L001	L33-0808-05	CHOKE COIL			
A-3	P024	E40-0273-05	PIN CONNECTOR	2 CONTACT		
A-3	R001	RD14BY2H224J	RES. CARBON	220K	5%	1/2W
C-3	R002	RC05GF2H225J	RES. SOLID	2.2M	5%	1/2W

ASTIG UNIT

X81-1430-00

REF.NO	PARTS NO	NAME & DESCRIPTION
	J25-5038-12	PCB (UNMOUNTED)
J063	E31-2467-15	LEAD WIRE WITH CONNECTOR
VR008	R12-3526-05	RES. SEMI FIXED 10K B
VR009	R12-5519-05	RES. SEMI FIXED 150K B

SWITCHING POWER SUPPLY

W02-0413-05

REF. NO	PARTS NO	NAME & DESCRIPTION			
D1	DBA20G	Diode			
D2	DFA01	Diode			
D3	DTA-10ER	Triac			
D4	DS442X	Diode			
D5	GFD10E	Diode			
D6	GFD10E	Diode			
D7	GFD10G	Diode			
D8	HZ3.6CP	Diode Zener			
D9	GZA6.2Z	Diode Zener			
Q1	2SC536KNP(F)	Transistor			
IC1	STK7308	IC			
IC2	STK732	IC			
L1	L19-0415-08	Line filter			
L2	L19-0414-08	Pulse Transformer			
L3	L33-0809-08	Coil	20µH		
L4	L33-0810-08	Coil	2.3µH		
L5	L33-0809-08	Coil	20µH		
L6	L40-4791-14	Ferri-inductor	4.7µH		
L7	L40-4791-14	Ferri-inductor	4.7µH		
L8	L40-4791-14	Ferri-inductor	4.7µH		
C1	C91-0599-08	Polyester cap	0.22µF		400V
C2	C91-0597-08	Ceramic cap	2200pF		250V
C3	C91-0597-08	Ceramic cap	2200pF		250V
C4	C91-0597-08	Ceramic cap	2200pF		250V
C5	C91-0597-08	Ceramic cap	2200pF		250V
C6	C90-0925-08	Electrolytic cap	100µF		400V
C7	C90-0926-08	Electrolytic cap	4.7µF		50V
C8	C90-0927-08	Electrolytic cap	10µF		50V
C9	C90-0928-08	Electrolytic cap	47µF		25V
C10	CK45B1H103K	Ceramic cap	0.01µF		50V
C11	C91-0598-08	Ceramic cap	0.001µF		1kV
C12	C90-0929-08	Electrolytic cap	470µF		16V
C13	C90-0930-08	Electrolytic cap	1000µF		10V
C14	C90-0929-08	Electrolytic cap	470µF		16V
C15	C90-0931-08	Electrolytic cap	220µF		35V
C16	C90-0932-08	Electrolytic cap	100µF		63V
C17	C90-0933-08	Electrolytic cap	22µF		160V
C18	C90-0934-08	Electrolytic cap	220µF		16V
C19	C90-0931-08	Electrolytic cap	220µF		35V
C20	C90-0935-08	Electrolytic cap	22µF		50V
C21	C90-0936-08	Electrolytic cap	10µF		100V
C22	C90-0933-08	Electrolytic cap	22µF		160V
C23	C91-0600-08	Ceramic cap	0.01µF		630V
C24	C91-0598-08	Ceramic cap	0.001µF		1kV
C25	C91-0598-08	Ceramic cap	0.001µF		1kV
C26	C90-0937-08	Electrolytic cap	22µF		16V
R1	R92-1111-08	Widing res	10Ω		3W
R2	R92-1112-08	Widing res	2Ω		3W
R3	RD14BB2E910J	Carbon res	91Ω	±5%	1/4W
R4	R92-1113-08	Metal oxide res	220kΩ		1W
R5	RD14BB2E562J	Carbon res	5.6kΩ	±5%	1/4W
R6	RD14BB2E103J	Carbon res	10kΩ	±5%	1/4W
R7	R92-1114-08	Metal oxide res	33Ω		1W
R8	RD14BB2E102J	Carbon res	1kΩ	±5%	1/4W
R9	RD14BB2E100J	Carbon res	10Ω	±5%	1/4W
R12	RN14BK2E2201F	Metal film	2.2kΩ	±1%	1/4W
VR1	R12-3532-08	Semi-fixed res	10kΩ		
	E40-7011-08	Pin connector	3P		
	E40-7012-08	Pin connector	7P		
	F20-0643-08	Insulating sheet	(STK7308)		
	F20-0644-08	Insulating sheet	(STK732)		

VOLTAGES AND WAVEFORMS

oltages and waveforms are measured on each atic diagram as follows;

EQUIPMENT

multimeter : DL-720 (TRIO)
scope : 475A (TEKTRONIX)
ave generator : SG-502 (TEKTRONIX)

ROL SETTINGS

TENSITY	Midrange
US	Midrange
ND-DC	GND for voltage measurement DC for waveform measurement
SITION	Midrange
, CH2 GAIN	OFF
, CH2 IABLE	CAL
, CH2 TS/DIV	0.2 V
INV	OFF
ODE	Unless otherwise specified CH1
Hz BW	OFF
COUPLING	AC
SLOPE	+
. MODE	AUTO
DOFF	NORM
VEEP TIME/DIV	0.2 ms
VEEP TIME/DIV	50 μs
ARIABLE	CAL
POSITION	Midrange
Z DISPLAY	A
MAG	OFF

:
ferencial circuit, the voltages and waveforms are only CH1 and CH3.

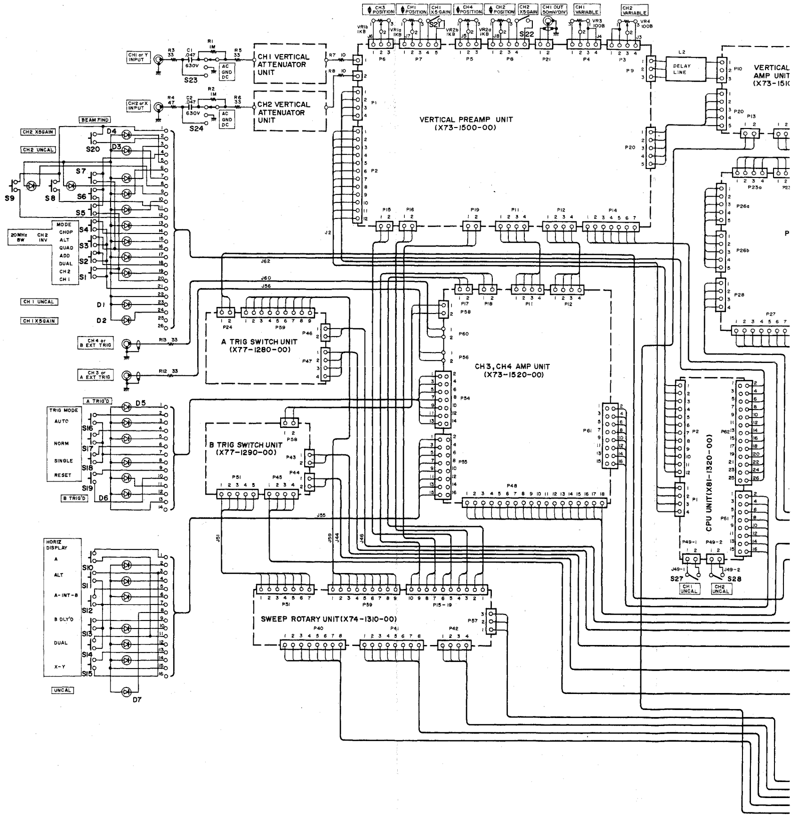
Voltage Measurements

Voltage measurements are taken with no signal applied and the trace positioned to the center horizontal graticule line. The digital multimeter common should be connected to chassis ground at the nearest measurement point.

Waveform Condition

Waveforms are measured with 1 kHz 1 Vp-p sine wave applied CH1 input and 1 kHz 500 m Vp-p applied CH3 input.

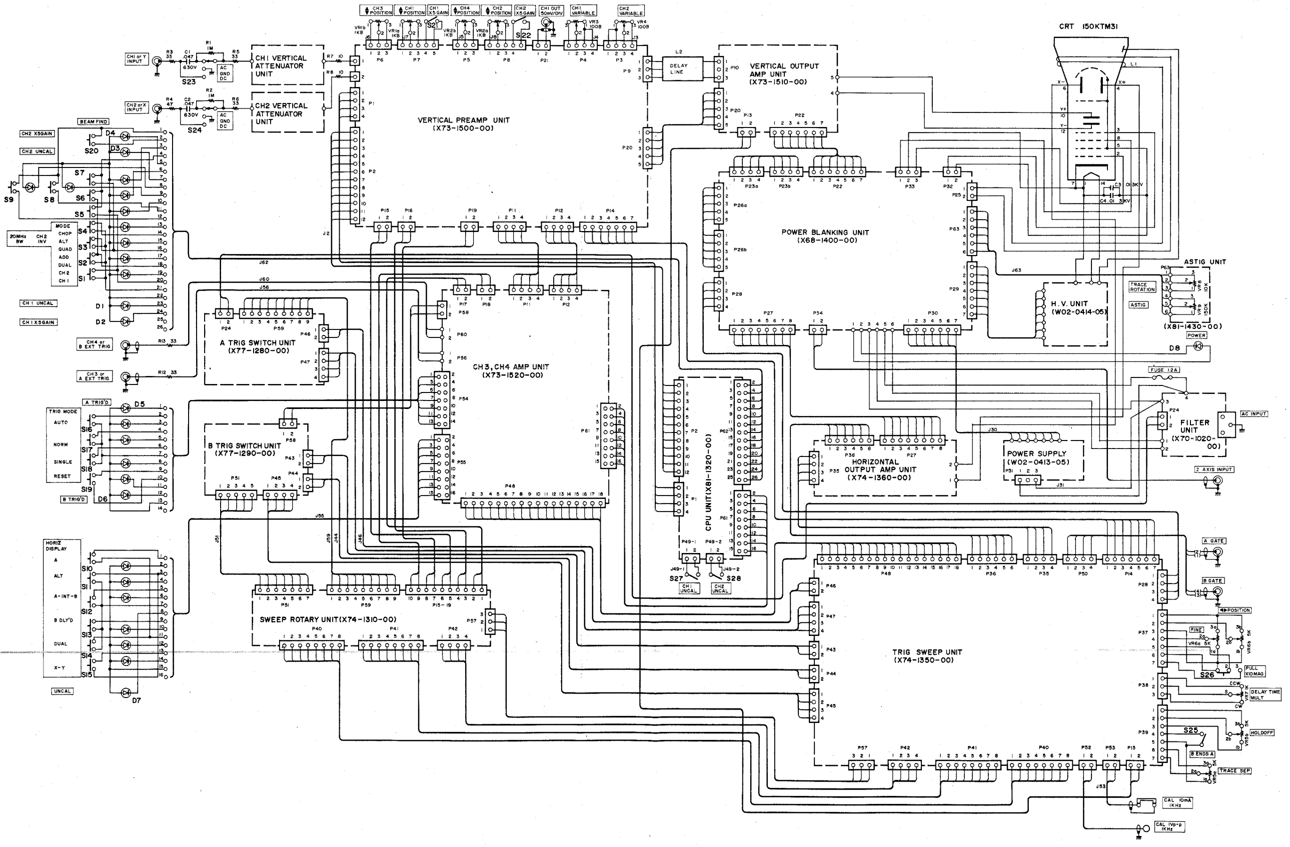
SCHEMATIC DIAGRAM


CH1 VERTICAL ATTENUATOR UNIT
CH2 VERTICAL ATTENUATOR UNIT
VERTICAL PREAMP UNIT (X73-1500-00)
DELAY LINE
VERTICAL AMP UNIT (X73-151
A TRIG SWITCH UNIT (X77-1280-00)
CH3, CH4 AMP UNIT (X73-1520-00)
B TRIG SWITCH UNIT (X77-1290-00)
CPU UNIT (X81-1320-00)
SWEEP ROTARY UNIT (X74-1310-00)
CH1 or Y INPUT
CH2 or X INPUT
CH4 or B EXT TRIG
CH3 or A EXT TRIG
BEAM FIND
CH2 X5GAIN
CH2 UNCAL
CH1 UNCAL
CH1 X5GAIN
TRIG MODE
AUTO
NORM
SINGLE
RESET
A TRIG'D
B TRIG'D
HORIZ DISPLAY
A
ALT
A-INT-B
B DLY'D
DUAL
X-Y
UNCAL
MODE
CHOP
ALT
QUAD
ADD
DUAL
CH2
CH1
20MHz BW
CH2 INV
CH3 POSITION
CH1 POSITION
CH1 X5 GAIN
CH4 POSITION
CH2 POSITION
CH2 X5GAIN
CH1 OUT 50mV/DIV
CH1 VARIABLE
CH2 VARIABLE
S27
S28
CH1 UNCAL
CH2 UNCAL
]

l applied and
raticule line.
onnected to
int.

ne wave ap-
d CH3 input.

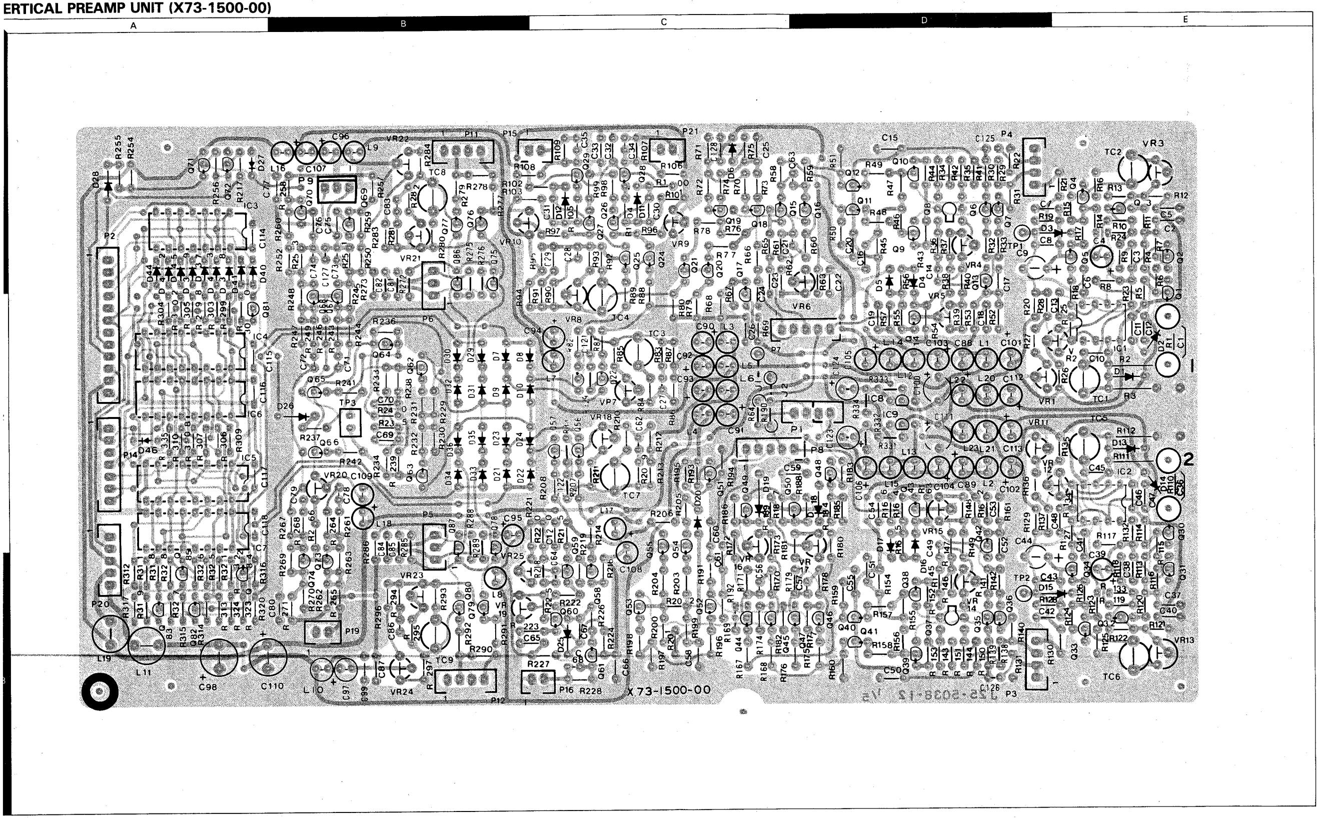
SCHEMATIC DIAGRAM



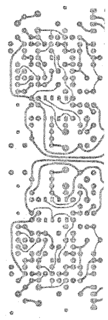
CH3 POSITION
CH1 POSITION
CH1 X5 GAIN
CH4 POSITION
CH2 POSITION
CH2 X5 GAIN
CH1 OUT 50mV/DIV
CH1 VARIABLE
CH2 VARIABLE
CH1 or Y INPUT
CH2 or X INPUT
S23
S24
CH1 VERTICAL ATTENUATOR UNIT
CH2 VERTICAL ATTENUATOR UNIT
VERTICAL PREAMP UNIT (X73-1500-00)
DELAY LINE
VERTICAL OUTPUT AMP UNIT (X73-1510-00)
CRT 150KTM31
POWER BLANKING UNIT (X68-1400-00)
ASTIG UNIT
TRACE ROTATION
ASTIG
H.V. UNIT (W02-0414-05)
(X81-1430-00)
POWER
D8
FUSE 1.2A
FILTER UNIT (X70-1020-00)
AC INPUT
POWER SUPPLY (W02-0413-05)
HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)
Z AXIS INPUT
BEAM FIND
CH2 X5GAIN
CH2 UNCAL
CH1 UNCAL
CH1 X5GAIN
MODE
CHOP
ALT
QUAD
ADD
DUAL
CH2
CH1
20MHz BW
CH2 INV
CH4 or B EXT TRIG
CH3 or A EXT TRIG
A TRIG SWITCH UNIT (X77-1280-00)
CH3, CH4 AMP UNIT (X73-1520-00)
CPU UNIT (X81-1320-00)
A TRIG'D
TRIG MODE
AUTO
NORM
SINGLE
RESET
B TRIG'D
B TRIG SWITCH UNIT (X77-1290-00)
HORIZ DISPLAY
A
ALT
A-INT-B
B DLY'D
DUAL
X-Y
UNCAL
SWEEP ROTARY UNIT (X74-1310-00)
S27
S28
CH1 UNCAL
CH2 UNCAL
TRIG SWEEP UNIT (X74-1350-00)
A GATE
B GATE
POSITION
FINE
PULL X10MAG
S26
DELAY TIME MULT
HOLDOFF
S25
B ENDS A
TRACE SEP
CAL 10mA 1KHz
CAL 1Vp-p 1KHz

PC BOARD

ERTICAL PREAMP UNIT (X73-1500-00)

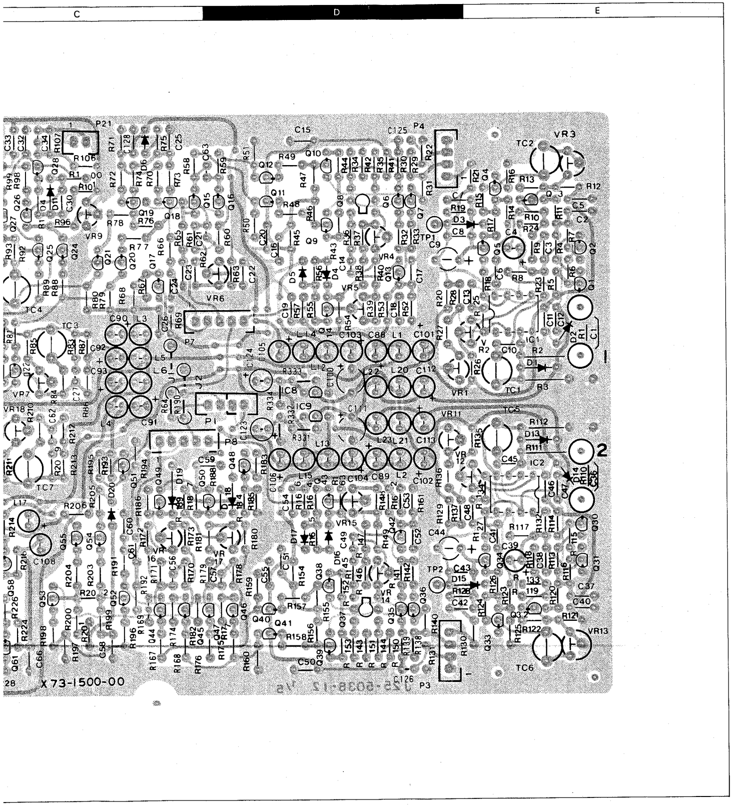


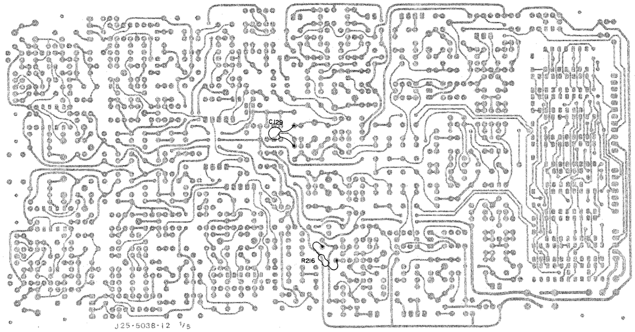
A
B
C
D
E
X73-1500-00
P2
P14
P20
P19
P5
P6
P9
P11
P12
P15
P16
P21
P1
P8
P4
P3
VR1
VR3
VR13
TC1
TC2
TC3
TC4
TC5
TC6
TC7
TC8
TC9
IC1
IC2
IC3
IC4
IC5
IC6
IC7
TP1
TP2
TP3
1
2



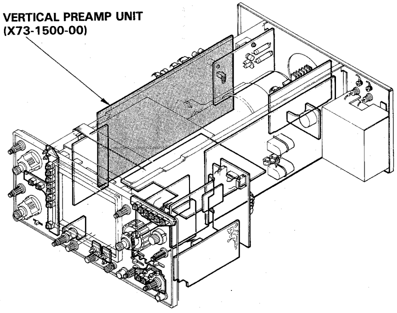
(FOIL SIDE VIEW)

PC BOARD

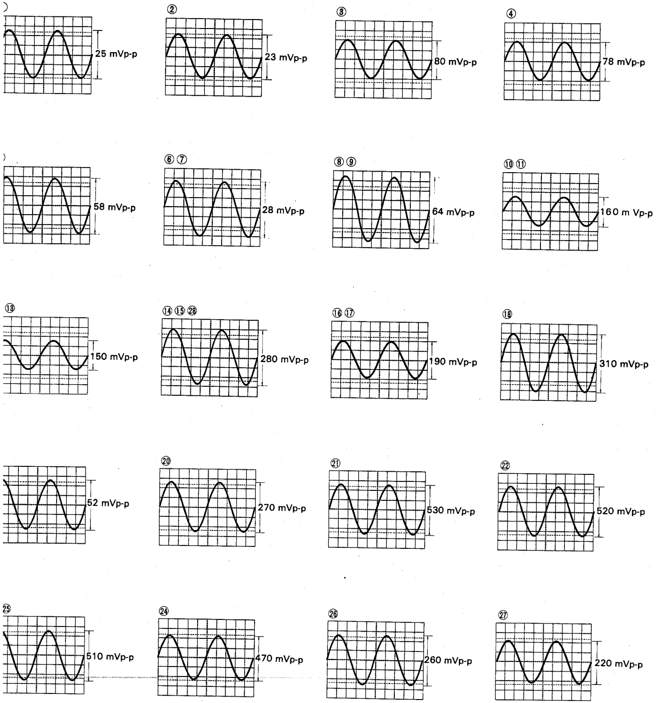

C
D
E
P21
TC2
VR3
TC1
TC5
TC6
TC7
VR13
IC1
IC2
P1
P3
P4
P7
P8
TP1
TP2
X73-1500-00
J25-5038-12 1/5


C128
R216
J25-5038-12 1/5

(FOIL SIDE VIEW)

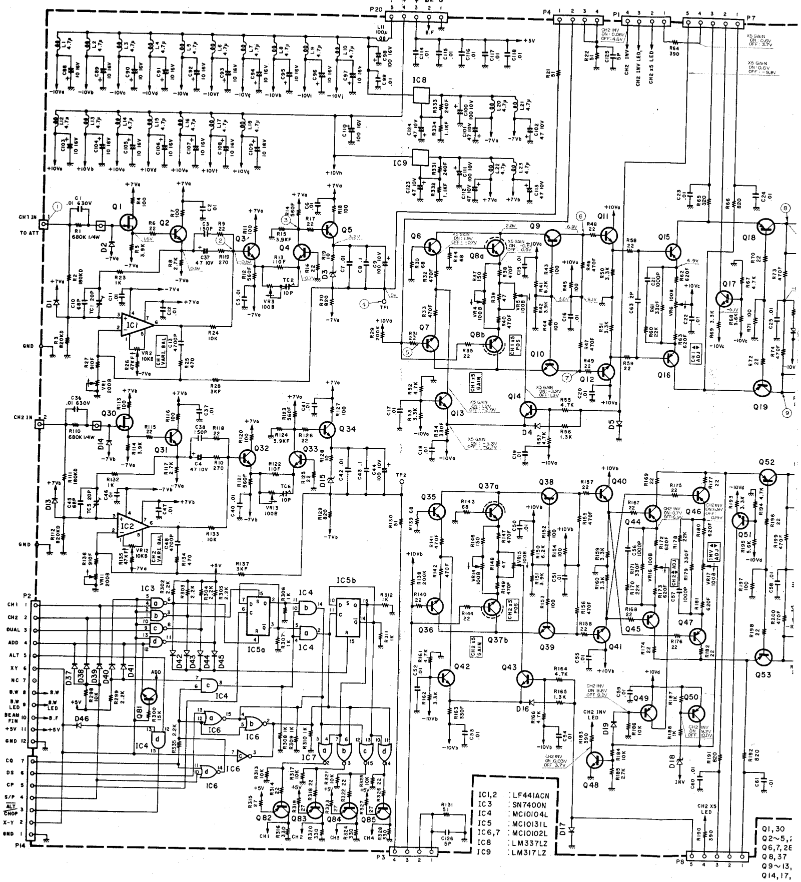

VERTICAL PREAMP UNIT
(X73-1500-00)

WAVEFORMS

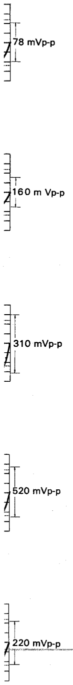


SCHEMATIC DIAGRAM

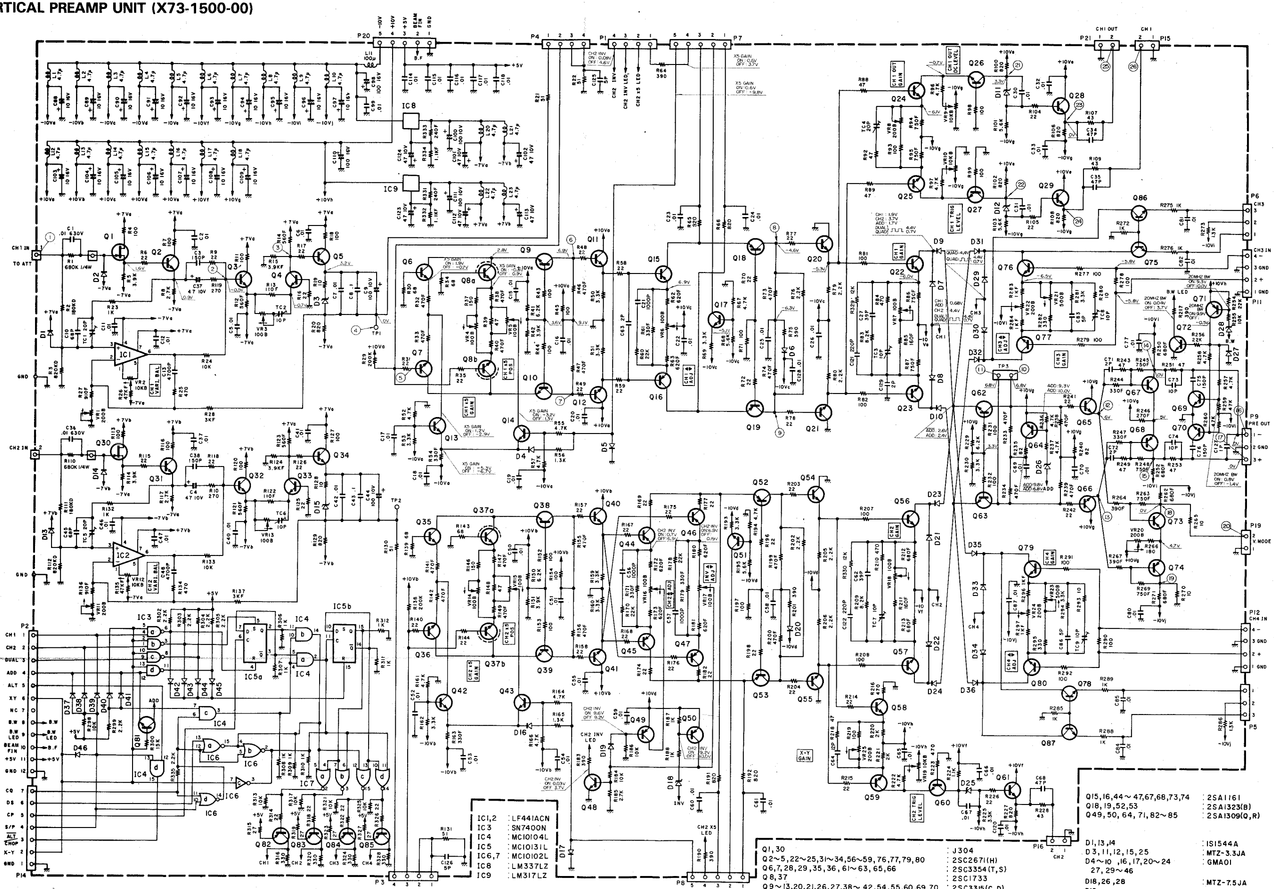
VERTICAL PREAMP UNIT (X73-1500-00)


P20
P4
P1
P7
P2
P3
P8
P14
CH1 IN
TO ATT
CH2 IN
GND
TP1
TP2
IC1
IC2
IC3
IC4
IC5a
IC5b
IC6
IC7
IC8
IC9
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8a
Q8b
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q30
Q31
Q32
Q33
Q34
Q35
Q36
Q37a
Q37b
Q38
Q39
Q40
Q41
Q42
Q43
Q44
Q45
Q46
Q47
Q48
Q49
Q50
Q51
Q52
Q53
Q81
Q82
Q83
Q84
Q85
CH1 VARI. BAL
CH2 VARI. BAL
CH1 x5 GAIN
CH2 x5 GAIN
CH1 x5 POS
CH2 x5 POS
CH1 ADJ
CH2 ADJ
INV ADJ
CH2 INV LED
CH2 x5 LED
CH1
CH2
DUAL
ADD
ALT
XY
NC
B.W
B.W LED
BEAM FIN
+5V
GND
CQ
DS
CP
S/P
ALT CHOP
X-Y
IC1,2 : LF441ACN
IC3 : SN7400N
IC4 : MC10104L
IC5 : MC10131L
IC6,7 : MC10102L
IC8 : LM337LZ
IC9 : LM317LZ
Q1,30
Q2~5,
Q6,7,28
Q8,37
Q9~13,
Q14,17,

SCHEMATIC DIAGRAM


78 mVp-p
160 m Vp-p
310 mVp-p
520 mVp-p
220 mVp-p

VERTICAL PREAMP UNIT (X73-1500-00)


P20
-10V
+10V
+5V
BEAM FIN
GND
P4
P1
P7
P21
CH1 OUT
CH1
P15
P6
CH3
CH3 IN
P11
P9
PRE OUT
P19
V.MODE
P12
CH4 IN
P5
P16
CH2
P8
P3
P14
P2
CH1 IN
TO ATT
CH2 IN
GND
CH1
CH2
DUAL
ADD
ALT
XY
NC
B.W
B.W LED
BEAM FIN
+5V
GND
CQ
DS
CP
S/P
ALT CHOP
X-Y
IC1
IC2
IC3
IC4
IC5a
IC5b
IC6
IC7
IC8
IC9
CH1 VARI. BAL
CH2 VARI. BAL
CH1 ×5 GAIN
CH1 ×5 POS
CH2 ×5 GAIN
CH2 ×5 POS
CH1 ADJ
CH2 ADJ
INV ADJ
CH1 OUT GAIN
CH1 OUT DCLEVEL
CH1 TRIG LEVEL
CH2 TRIG LEVEL
CH1 GAIN
CH2 GAIN
CH3 ADJ
CH3 GAIN
CH4 GAIN
CH4 ADJ
X-Y GAIN
TP1
TP2
TP3
20MHz BW
X5 GAIN
CH2 INV
CH2 ×5 LED
CH2 INV LED
B.W LED
INV

IC1,2	:LF441ACN
IC3	:SN7400N
IC4	:MC10104L
IC5	:MC10131L
IC6,7	:MC10102L
IC8	:LM337LZ
IC9	:LM317LZ

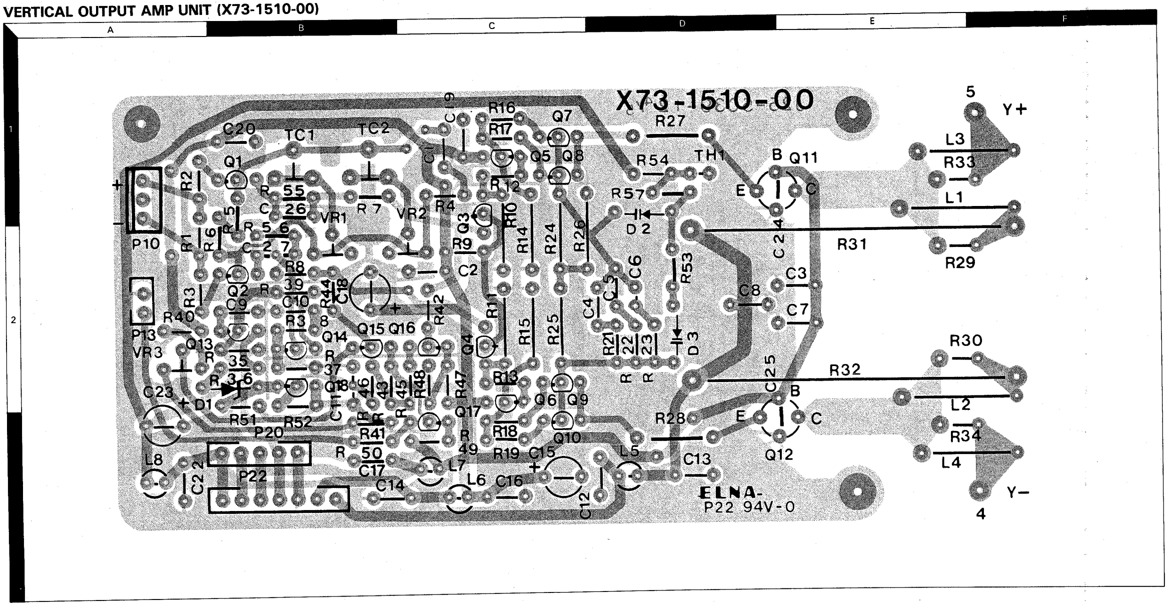
Q1,30	:J304
Q2~5,22~25,31~34,56~59,76,77,79,80	:2SC2671(H)
Q6,7,28,29,35,36,61~63,65,66	:2SC3354(T,S)
Q8,37	:2SC1733
Q9~13,20,21,26,27,38~42,54,55,60,69,70	:2SC3315(C,D)
Q14,17,43,48,51,72,75,78,81,86,87	:2SC3311(R)

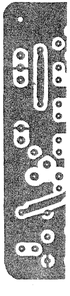
Q15,16,44~47,67,68,73,74	:2SA1161
Q18,19,52,53	:2SA1323(B)
Q49,50,64,71,82~85	:2SA1309(Q,R)

D1,13,14	:1S1544A
D3,11,12,15,25	:MTZ-3.3JA
D4~10 ,16,17,20~24 27,29~46	:GMA01
D18,26,28	:MTZ-7.5JA
D19	:1N60

PC BOARD

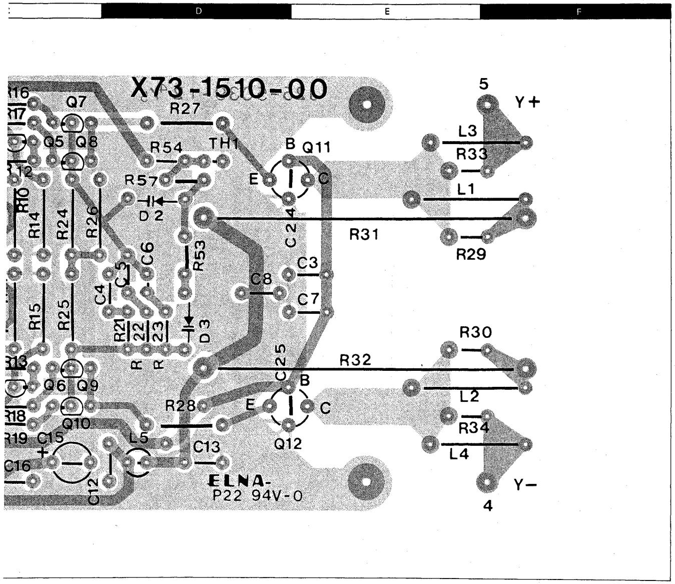
VERTICAL OUTPUT AMP UNIT (X73-1510-00)

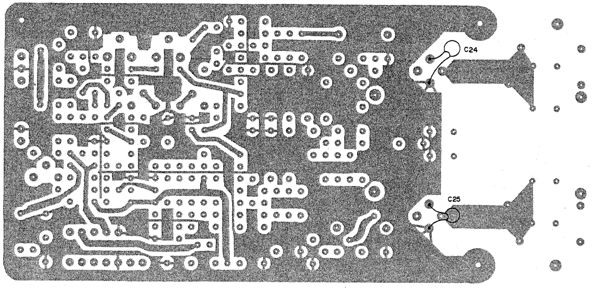

A
B
C
D
E
F
1
2
X73-1510-00
C20
TC1
TC2
C19
R16
R17
Q7
R27
5
Y+
L3
R33
Q1
R2
R55
C26
VR1
R 7
VR2
R4
Q5
Q8
R54
TH1
B
Q11
E
C
R57
R12
Q3
R10
R14
R24
R26
D2
L1
R31
R29
+
−
P10
R5
R56
C27
R1
R6
R9
C2
C24
R53
C6
C5
C4
C3
C8
C7
R8
R39
C18
R44
C10
Q2
C9
R3
R40
P13
VR3
Q13
Q14
Q15
Q16
R42
R11
Q4
R15
R25
R21
R22
R23
D3
R30
R32
R35
R36
C23
D1
R37
Q18
C11
R46
R43
R45
R48
R47
Q17
R13
Q6
Q9
C25
R51
R52
P20
R41
R49
R18
Q10
R28
L2
R34
L8
C22
P22
R50
C17
C14
L7
L6
C16
R19
C15
L5
C13
C12
Q12
L4
Y−
4
ELNA-
P22 94V-0


(COMPONEN

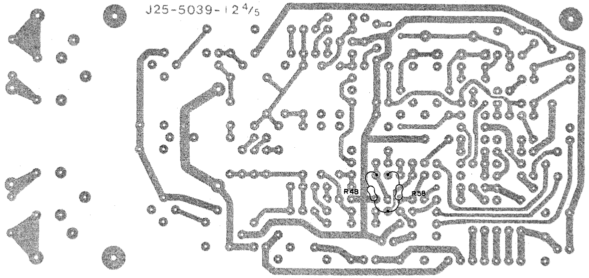
(FOIL SIDE

PC BOARD

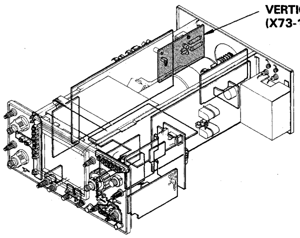

D
E
F
X73-1510-00
R16
R17
Q7
R27
Q5
Q8
R54
TH1
B
Q11
R57
E
C
12
R10
D2
R14
R24
R26
C24
R31
C6
C5
C4
R53
C3
C8
C7
R15
R25
R21
22
23
R
R
D3
R30
R32
C25
B
R13
Q6
Q9
R28
E
C
R18
Q10
R34
R19
C15
L5
C13
Q12
L4
C16
C12
ELNA-
P22 94V-0
5
Y+
L3
R33
L1
R29
L2
Y−
4



(COMPONENT SIDE VIEW)

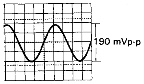

J25-5039-12 4/5
R48
R58

(FOIL SIDE VIEW)



VERTICAL OUTPUT AMP UNIT
(X73-1510-00)

WAVEFORMS



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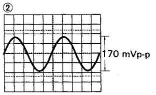
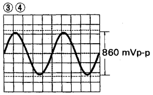
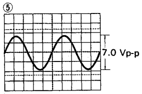
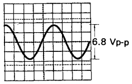


③④



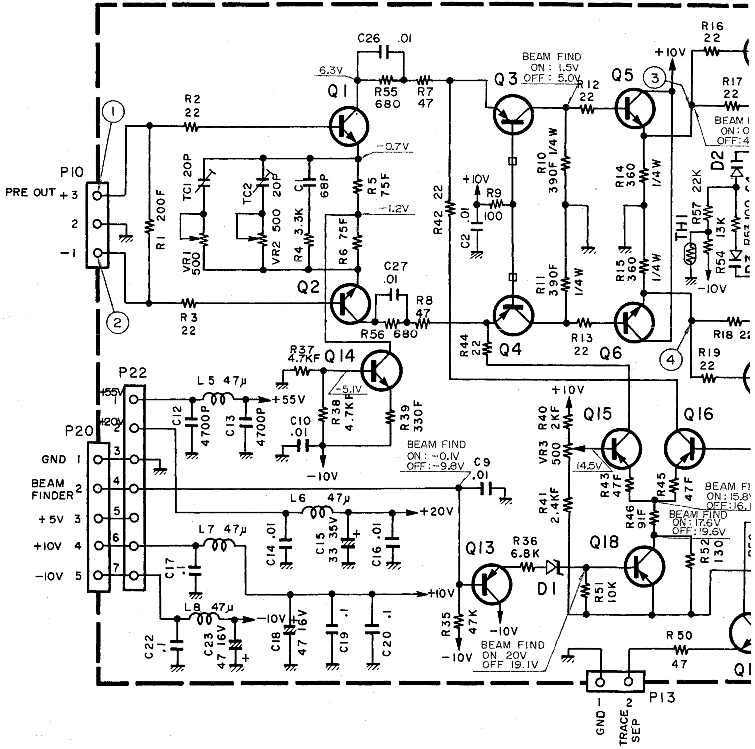
⑤





SCHEMATIC DIAGRAM

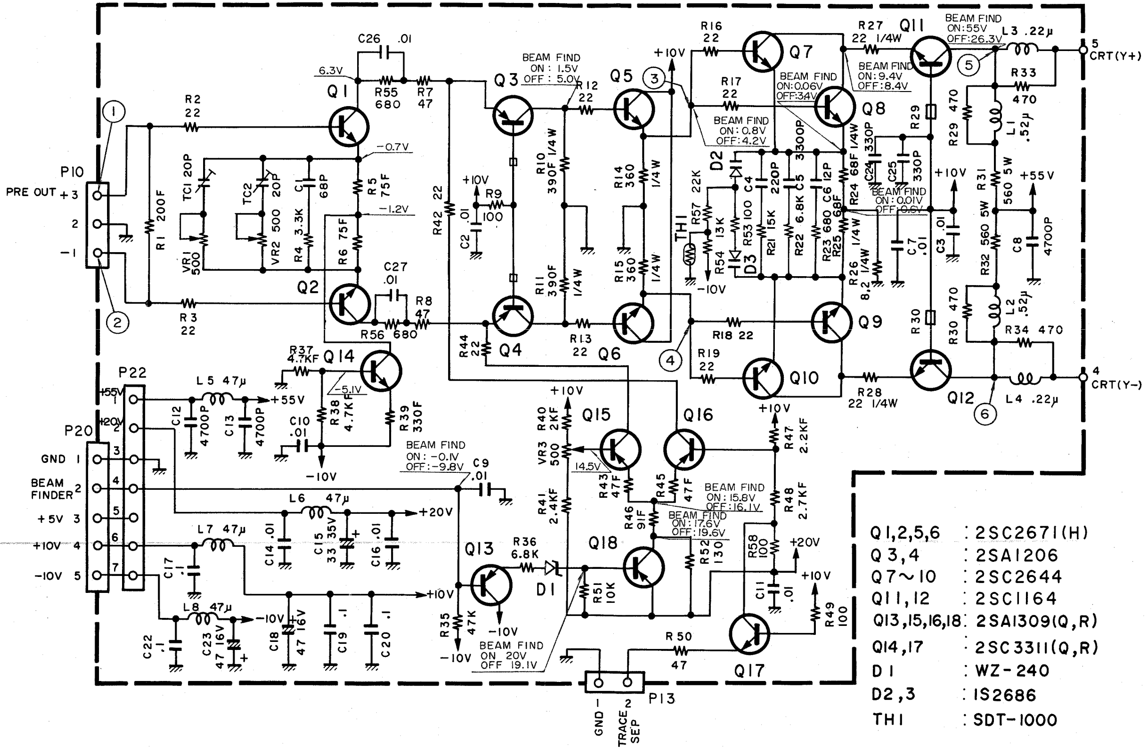
VERTICAL OUTPUT AMP UNIT (X73-1510-00)


P10
PRE OUT +3
2
−1
①
②
R2 22
R3 22
R1 200F
TC1 20P
VR1 500
TC2 20P
VR2 500
R4 3.3K
C1 68P
Q1
Q2
6.3V
−0.7V
−1.2V
R5 75F
R6 75F
C26 .01
R55 680
R7 47
C27 .01
R8 47
R56 680
R42 22
R44 22
+10V
R9 100
C2 .01
Q3
Q4
BEAM FIND
ON : 1.5V
OFF : 5.0V
R12 22
R10 390F 1/4W
R11 390F 1/4W
R13 22
Q5
Q6
R14 360 1/4W
R15 360 1/4W
③
④
+10V
R16 22
R17 22
R18 22
R19 22
BEAM
ON:
OFF:4
D2
R57 22K
R54 13K
TH1
−10V
R37 4.7KF
Q14
−5.1V
R38 4.7KF
R39 330F
C10 .01
−10V
P22
P20
+55V
+20V
GND 1
BEAM FINDER 2
+5V 3
+10V 4
−10V 5
1
2
3
4
5
6
7
L5 47μ
+55V
C12 4700P
C13 4700P
L6 47μ
+20V
C14 .01
C15 33 35V
C16 .01
L7 47μ
C17 .1
+10V
L8 47μ
−10V
C22 .1
C23 47 16V
C18 47 16V
C19 .1
C20 .1
BEAM FIND
ON : −0.1V
OFF : −9.8V
C9 .01
Q13
R35 47K
−10V
−10V
R36 6.8K
D1
BEAM FIND
ON 20V
OFF 19.1V
+10V
R40 2KF
VR3 500
14.5V
R41 2.4KF
R43 47F
Q15
Q16
R45 47F
R46 91F
BEAM FIND
ON : 17.6V
OFF : 19.6V
BEAM FI
ON : 15.8
OFF : 16.
Q18
R51 10K
R52 130
R50 47
Q1
P13
GND 1
2 TRACE SEP

7.0 Vp-p

SCHEMATIC DIAGRAM

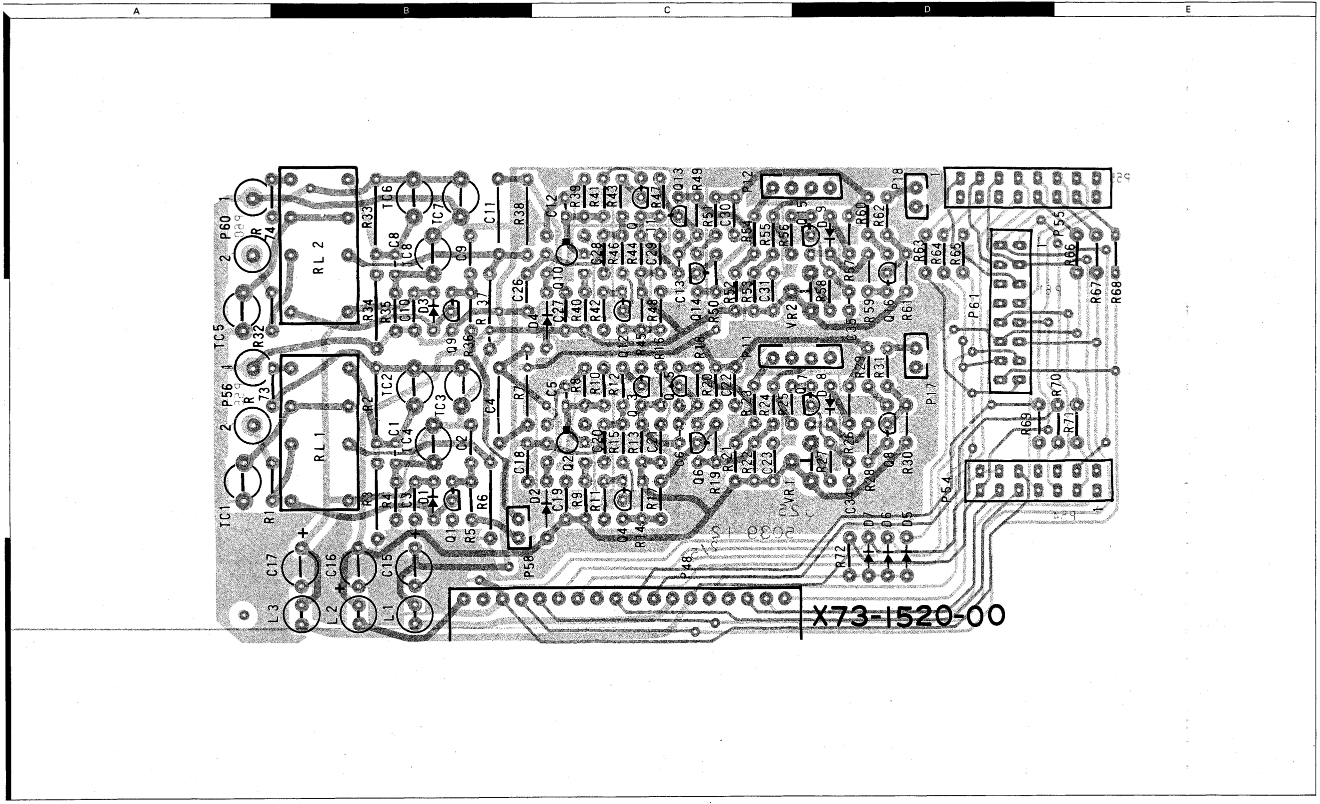
VERTICAL OUTPUT AMP UNIT (X73-1510-00)


P10
PRE OUT +3
2
−1
①
②
R1 200F
R2 22
R3 22
Q1
Q2
6.3V
−0.7V
−1.2V
C26 .01
R55 680
R7 47
TC1 20P
TC2 20P
C1 68P
VR1 500
VR2 500
R4 3.3K
R5 75F
R6 75F
C27 .01
R8 47
R56 680
R37 4.7KF
Q14
−5.1V
R38 4.7KF
R39 330F
C10 .01
−10V
Q3
Q4
BEAM FIND ON : 1.5V OFF : 5.0V
R12 22
R10 390F 1/4W
R11 390F 1/4W
R42 22
R44 22
C2 .01
R9 100
+10V
Q5
Q6
R13 22
R14 360 1/4W
R15 360 1/4W
③
④
+10V
R16 22
Q7
R17 22
Q8
BEAM FIND ON:0.06V OFF:34V
BEAM FIND ON: 0.8V OFF:4.2V
R18 22
Q9
R19 22
Q10
D2
D3
C4 220P
C5 3300P
C6 12P
R57 22K
R54 13K
R53 100
R21 15K
R22 6.8K
R23 680
R25 68F
R24 68F 1/4W
TH1
−10V
R26 8.2 1/4W
R27 22 1/4W
R28 22 1/4W
Q11
Q12
BEAM FIND ON:9.4V OFF:8.4V
BEAM FIND ON:55V OFF:26.3V
BEAM FIND ON : 0.01V OFF:0.6V
C24 330P
C25 330P
C7 .01
C3 .01
R29
R29 470
R30
R30 470
R31 560 5W
R32 560 5W
+10V
+55V
C8 4700P
L1 .52μ
L2 .52μ
R33 470
R34 470
L3 .22μ
L4 .22μ
⑤
⑥
5 CRT(Y+)
4 CRT(Y−)
P22
P20
+55V 1
+20V 2
3
4
5
6
7
GND 1
BEAM FINDER 2
+5V 3
+10V 4
−10V 5
L5 47μ
+55V
C12 4700P
C13 4700P
L6 47μ
+20V
C14 .01
C15 35V 33
C16 .01
L7 47μ
C17 .1
+10V
L8 47μ
−10V
C22 .1
C23 47 16V
C18 47 16V
C19 .1
C20 .1
BEAM FIND ON : −0.1V OFF:−9.8V
C9 .01
Q13
R36 6.8K
D1
R35 47K
−10V
BEAM FIND ON 20V OFF 19.1V
+10V
R40 2KF
VR3 500
14.5V
R41 2.4KF
Q15
Q16
R43 47F
R45 47F
BEAM FIND ON: 15.8V OFF:16.1V
R46 91F
BEAM FIND ON: 17.6V OFF: 19.6V
Q18
R51 10K
R52 130
+10V
R47 2.2KF
R48 2.7KF
R58 100
+20V
C11 .01
+10V
R49 100
R50 47
Q17
P13
GND 1
TRACE SEP 2

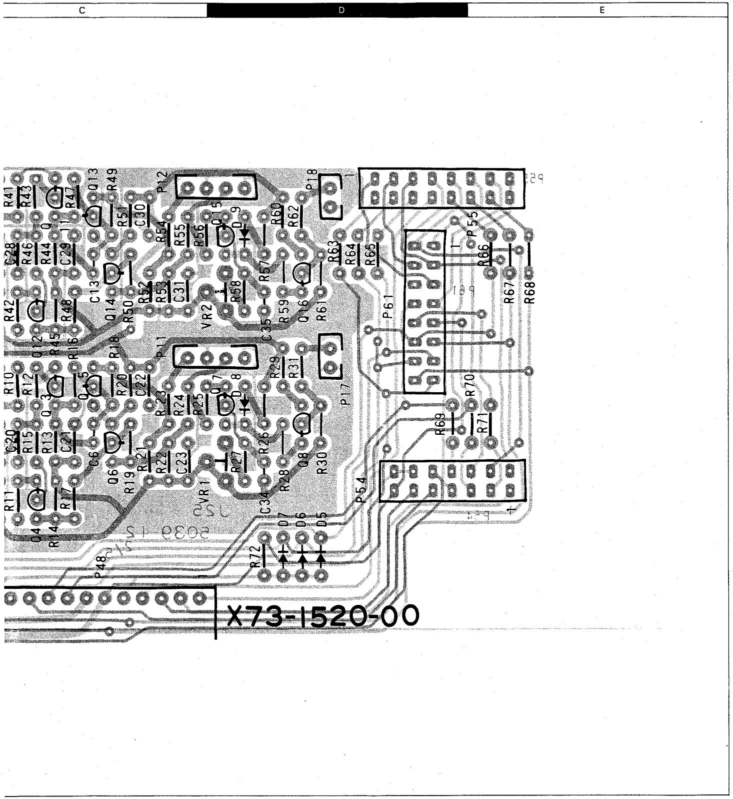
Q1,2,5,6 : 2SC2671(H)
Q3,4 : 2SA1206
Q7∼10 : 2SC2644
Q11,12 : 2SC1164
Q13,15,16,18 : 2SA1309(Q,R)
Q14,17 : 2SC3311(Q,R)
D1 : WZ-240
D2,3 : 1S2686
TH1 : SDT-1000

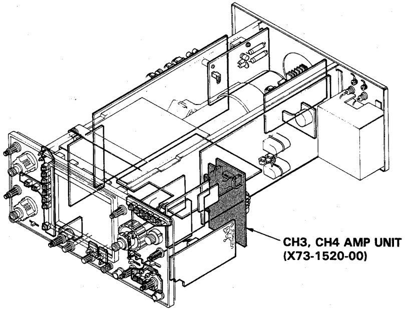
PC BOARD

H3, CH4 AMP UNIT (X73-1520-00)


A
B
C
D
E
X73-1520-00
RL 1
RL 2
P60
P56
P58
P48
P54
P55
P61
P11
P12
P17
P18
TC1
TC2
TC3
TC4
TC5
TC6
TC7
TC8
C1
C2
C3
C4
C5
C6
C8
C9
C10
C11
C12
C13
C15
C16
C17
C18
C19
C20
C21
C22
C23
C26
C27
C28
C29
C30
C31
C34
C35
L1
L2
L3
D1
D2
D3
D4
D5
D6
D7
D8
D9
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
VR1
VR2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
R52
R53
R54
R55
R56
R57
R58
R59
R60
R61
R62
R63
R64
R65
R66
R67
R68
R69
R70
R71
R72
R73
R74
1
2
5039-12

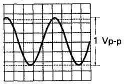
PC BOARD


C
D
E
X73-1520-00
R41
R43
R47
Q13
R49
P12
P18
R51
C30
R54
R55
R56
Q15
D9
R60
R62
C28
R46
R44
C29
C13
Q14
R52
R53
C31
VR2
R58
R57
R59
Q16
R61
R63
R64
R65
P55
R66
R67
R68
P61
R42
R48
R50
C35
P11
R45
R18
R16
R20
C22
R10
R12
Q3
Q5
R23
R24
R25
Q7
D8
R29
R31
P17
R70
R69
R71
C20
R15
R13
C21
Q6
R21
R22
C23
R27
R26
Q8
R30
R19
VR1
R28
C34
P54
R11
R17
Q4
R14
D7
D6
D5
R72
P48

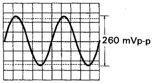

CH3, CH4 AMP UNIT
(X73-1520-00)

WAVEFORMS

②③



④



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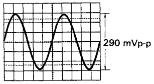

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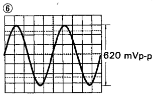

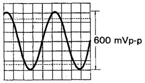

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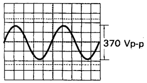
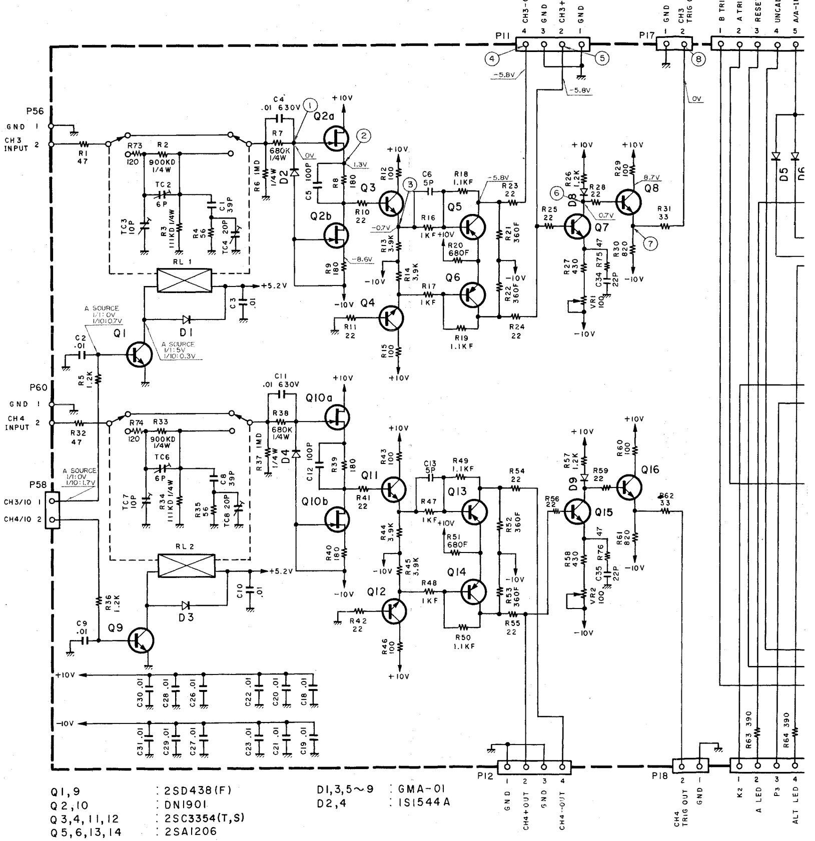


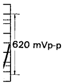
SCHEMATIC DIAGRAM

CH3, CH4 AMP UNIT (X73-1520-00)

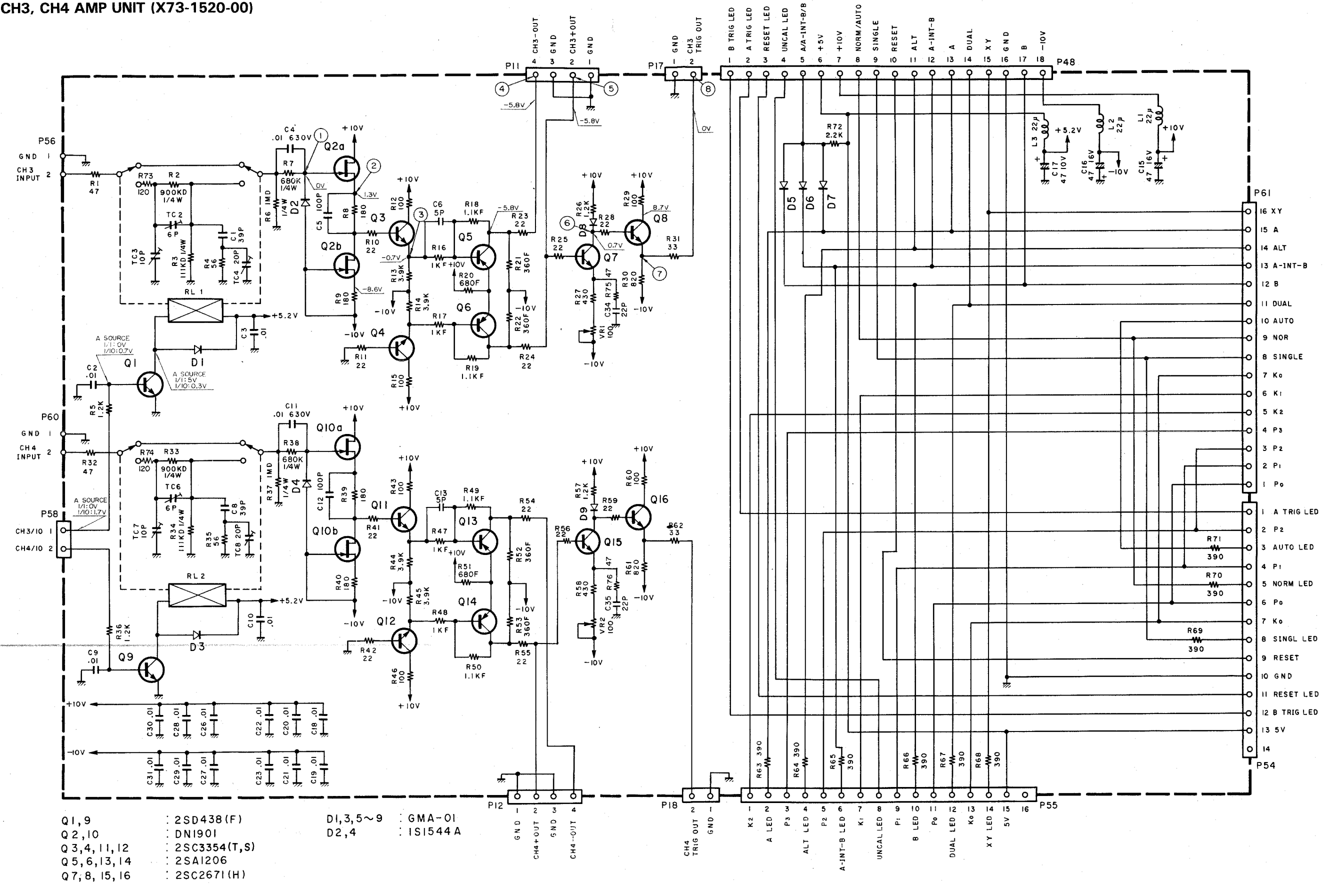

P11
CH3-OUT
GND
CH3+OUT
GND
P17
GND
CH3 TRIG OUT
B TRIG LED
A TRIG LED
RESET LED
UNCAL LED
A/A-INT-B/B
-5.8V
0V
P56
GND 1
CH3 INPUT 2
R1 47
R73 120
R2 900KD 1/4W
TC2 6P
TC3 10P
R3 111KD 1/4W
R4 56
C1 39P
TC4 20P
RL1
C4 .01 630V
R7 680K 1/4W
R6 1MD 1/4W
D2
Q2a
Q2b
C5 100P
R8 180
1.3V
R9 180
-8.6V
+5.2V
C3 .01
A SOURCE 1/1: 0V 1/10: 0.7V
A SOURCE 1/1: 5V 1/10: 0.3V
D1
Q1
C2 .01
R5 1.2K
+10V
-10V
R12 100
R10 22
Q3
Q4
R11 22
R15 100
C6 5P
R16 1KF
R18 1.1KF
R13 3.9K
R14 3.9K
R20 680F
R17 1KF
R19 1.1KF
-0.7V
Q5
Q6
R21 360F
R22 360F
R23 22
R24 22
R25 22
D8
R26 1.2K
R28 22
0.7V
Q7
Q8
R29 100
8.7V
R31 33
R27 430
R75 47
C34 22P
VR1 100
R30 820
P60
GND 1
CH4 INPUT 2
R32 47
R74 120
R33 900KD 1/4W
TC6 6P
TC7 10P
R34 111KD 1/4W
R35 56
C8 39P
TC8 20P
RL2
A SOURCE 1/1: 0V 1/10: 1.7V
P58
CH3/10 1
CH4/10 2
C11 .01 630V
R38 680K 1/4W
R37 1MD 1/4W
D4
Q10a
Q10b
C12 100P
R39 180
R40 180
D3
Q9
C9 .01
R36 1.2K
C10 .01
R43 100
R41 22
Q11
Q12
R42 22
R46 100
C13 5P
R47 1KF
R49 1.1KF
R44 3.9K
R45 3.9K
R51 680F
R48 1KF
R50 1.1KF
Q13
Q14
R52 360F
R53 360F
R54 22
R55 22
R56 22
D9
R57 1.2K
R59 22
Q15
Q16
R60 100
R62 33
R58 430
R76 47
C35 22P
VR2 100
R61 820
C30 .01
C28 .01
C26 .01
C22 .01
C20 .01
C18 .01
C31 .01
C29 .01
C27 .01
C23 .01
C21 .01
C19 .01
P12
GND
CH4+OUT
GND
CH4-OUT
P18
CH4 TRIG OUT
GND
R63 390
R64 390
K2
A LED
P3
ALT LED
D5
D6
①
②
③
④
⑤
⑥
⑦
⑧

Q1,9	: 2SD438(F)
Q2,10	: DN1901
Q3,4,11,12	: 2SC3354(T,S)
Q5,6,13,14	: 2SA1206
Q7,8,15,16	: 2SC2671(H)
D1,3,5～9	: GMA-01
D2,4	: 1S1544A

SCHEMATIC DIAGRAM



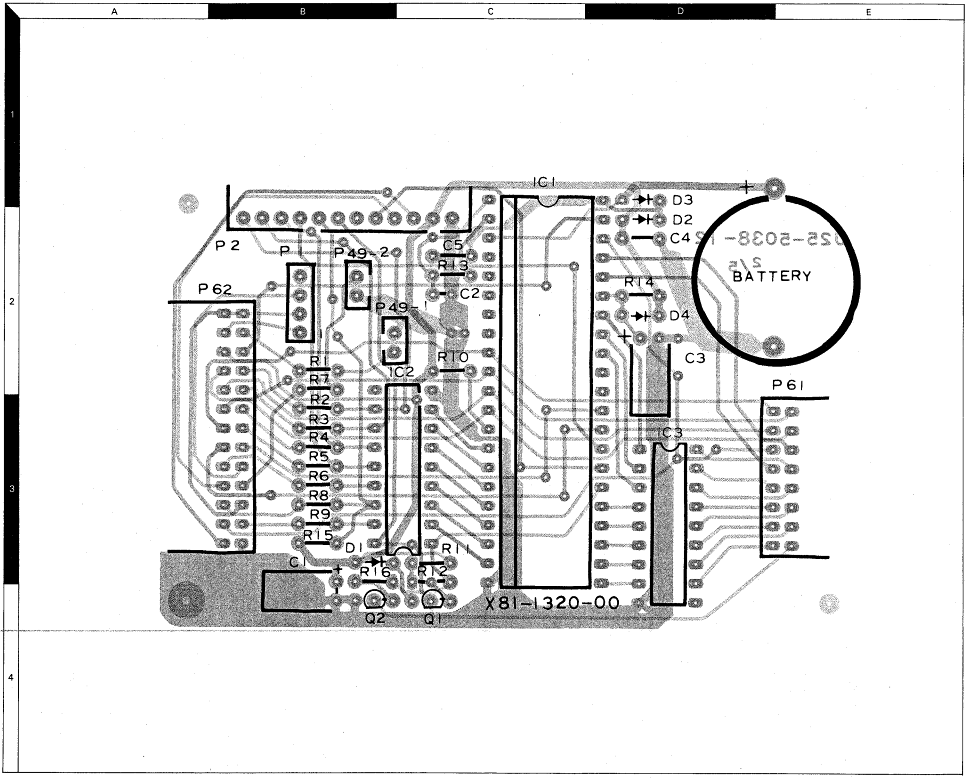
CH3, CH4 AMP UNIT (X73-1520-00)


P11
CH3-OUT
GND
CH3+OUT
GND
P17
GND
CH3 TRIG OUT
P48
B TRIG LED
A TRIG LED
RESET LED
UNCAL LED
A/A-INT-B/B
+5V
+10V
NORM/AUTO
SINGLE
RESET
ALT
A-INT-B
A
DUAL
XY
GND
B
-10V
P56
GND 1
CH3 INPUT 2
R1 47
R73 120
R2 900KD 1/4W
TC2 6P
TC3 10P
R3 111KD 1/4W
R4 56
C1 39P
TC4 20P
RL1
+5.2V
C3 .01
D1
Q1
C2 .01
A SOURCE 1/1: 0V 1/10: 0.7V
A SOURCE 1/1: 5V 1/10: 0.3V
R5 1.2K
C4 .01 630V
R7 680K 1/4W
R6 1MD 1/4W
D2
C5 100P
Q2a
Q2b
+10V
0V
1.3V
R8 180
R9 180
-8.6V
R10 22
R12 100
Q3
-0.7V
R13 3.9K
R14 3.9K
-10V
Q4
R11 22
R15 100
C6 5P
R16 1KF
R18 1.1KF
Q5
R20 680F
R17 1KF
Q6
R19 1.1KF
-5.8V
R23 22
R21 360F
R22 360F
R24 22
R25 22
R26 1.2K
D8
R28 22
0.7V
Q7
R27 430
C34 22P
R75 47
VR1 100
R29 100
8.7V
Q8
R31 33
R30 820
-5.8V
-5.8V
0V
R72 2.2K
D5
D6
D7
L3 22μ
+5.2V
C17 47 10V
L2 22μ
C16 47 16V
L1 22μ
C15 47 16V
P60
GND 1
CH4 INPUT 2
R32 47
R74 120
R33 900KD 1/4W
TC6 6P
TC7 10P
R34 111KD 1/4W
R35 56
C8 39P
TC8 20P
RL2
C10 .01
D3
Q9
C9 .01
R36 1.2K
P58
A SOURCE 1/1: 0V 1/10: 1.7V
CH3/10 1
CH4/10 2
C11 .01 630V
R38 680K 1/4W
R37 1MD 1/4W
D4
C12 100P
Q10a
Q10b
R39 180
R40 180
R41 22
R43 100
Q11
R44 3.9K
R45 3.9K
Q12
R42 22
R46 100
C13 5P
R47 1KF
R49 1.1KF
Q13
R51 680F
R48 1KF
Q14
R50 1.1KF
R54 22
R52 360F
R53 360F
R55 22
R56 22
R57 1.2K
D9
R59 22
Q15
R58 430
C35 22P
R76 47
VR2 100
R60 100
Q16
R62 33
R61 820
C30 .01
C28 .01
C26 .01
C22 .01
C20 .01
C18 .01
C31 .01
C29 .01
C27 .01
C23 .01
C21 .01
C19 .01
P12
GND
CH4+OUT
GND
CH4-OUT
P18
CH4 TRIG OUT
GND
P55
K2
A LED
P3
ALT LED
P2
A-INT-B LED
K1
UNCAL LED
P1
B LED
P0
DUAL LED
K0
XY LED
5V
R63 390
R64 390
R65 390
R66 390
R67 390
R68 390
P61
16 XY
15 A
14 ALT
13 A-INT-B
12 B
11 DUAL
10 AUTO
9 NOR
8 SINGLE
7 K0
6 K1
5 K2
4 P3
3 P2
2 P1
1 P0
P54
1 A TRIG LED
2 P2
3 AUTO LED
4 P1
5 NORM LED
6 P0
7 K0
8 SINGL LED
9 RESET
10 GND
11 RESET LED
12 B TRIG LED
13 5V
14
R71 390
R70 390
R69 390

Q1, 9	: 2SD438(F)
Q2, 10	: DN1901
Q3, 4, 11, 12	: 2SC3354(T, S)
Q5, 6, 13, 14	: 2SA1206
Q7, 8, 15, 16	: 2SC2671(H)
D1, 3, 5~9	: GMA-01
D2, 4	: 1S1544A

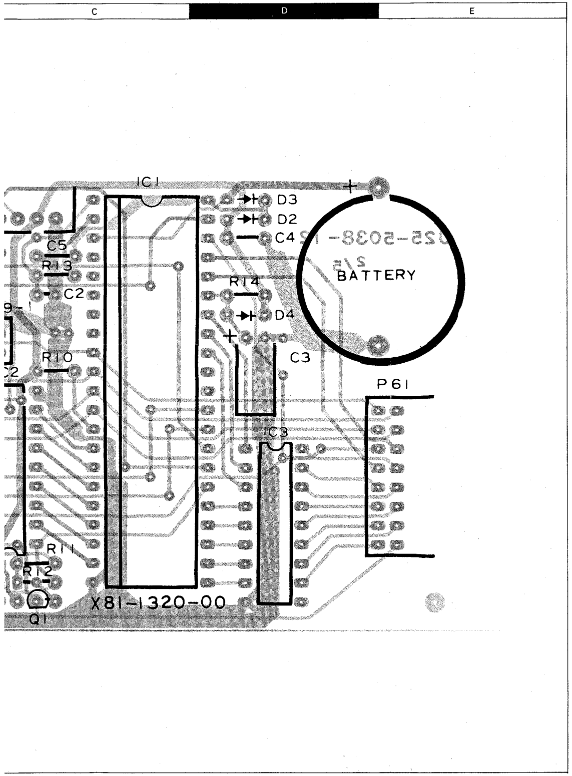
PC BOARD

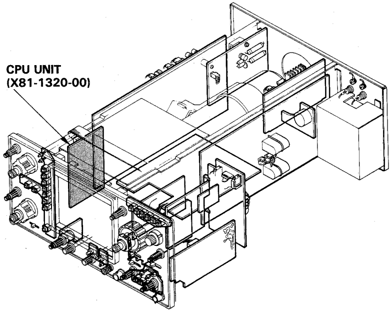
CPU UNIT (X81-1320-00)



A
B
C
D
E
1
2
3
4
IC1
D3
D2
C4
BATTERY
P2
P1
P49-2
C5
R13
C2
R14
D4
P62
P49-1
R10
C3
R1
R7
IC2
R2
R3
R4
R5
R6
R8
R9
R15
P61
IC3
D1
R11
C1
R16
R12
Q2
Q1
X81-1320-00

PC BOARD

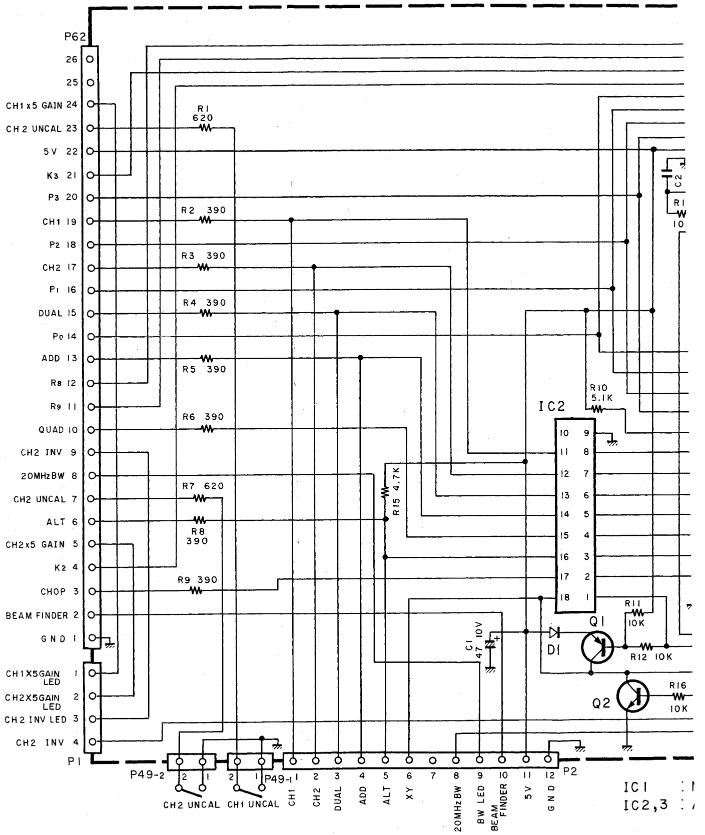

C
D
E
IC1
D3
D2
C4
BATTERY
C5
R13
C2
R14
D4
C3
R10
P61
IC3
R11
R12
Q1
X81-1320-00


CPU UNIT
(X81-1320-00)

WAVEFORMS

SCHEMATIC DIAGRAM

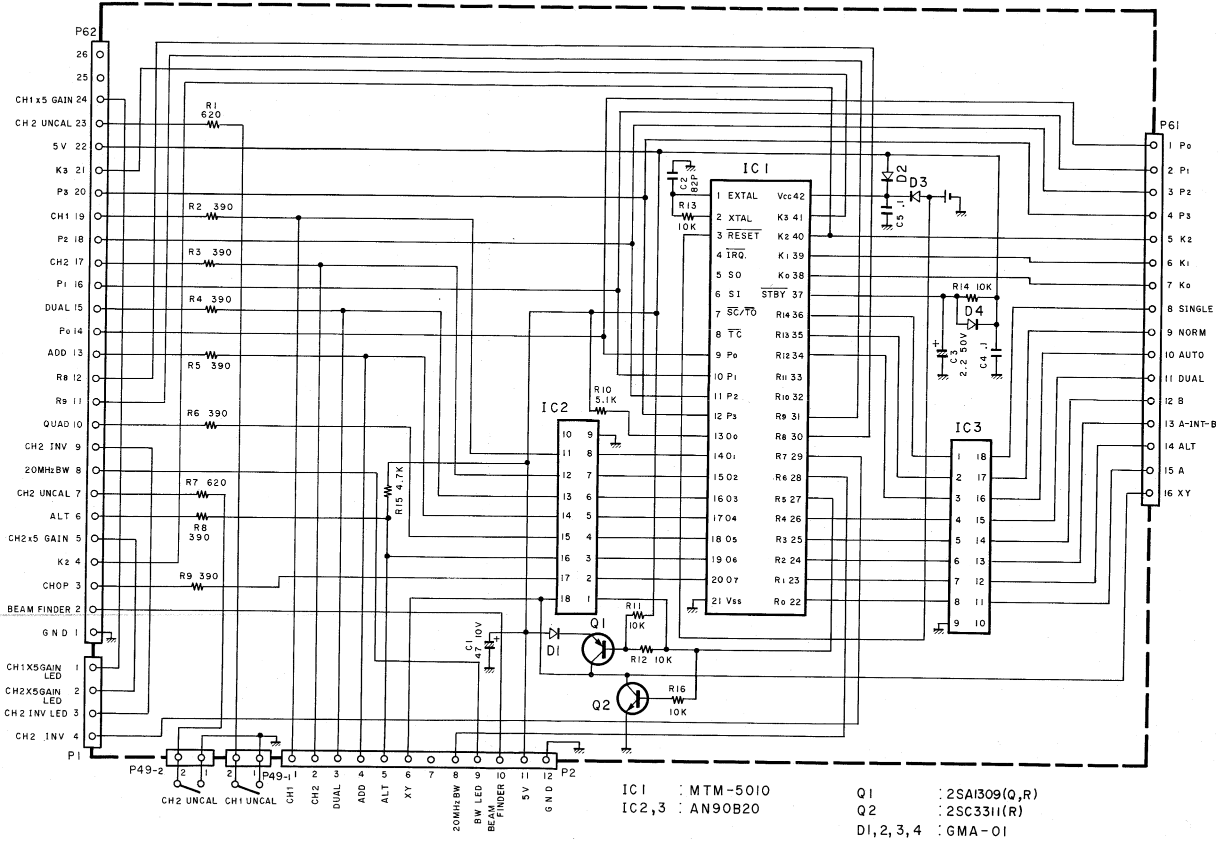
CPU UNIT (X81-1320-00)



P62
26
25
CH1x5 GAIN 24
CH2 UNCAL 23
5V 22
K3 21
P3 20
CH1 19
P2 18
CH2 17
P1 16
DUAL 15
P0 14
ADD 13
R8 12
R9 11
QUAD 10
CH2 INV 9
20MHzBW 8
CH2 UNCAL 7
ALT 6
CH2x5 GAIN 5
K2 4
CHOP 3
BEAM FINDER 2
GND 1
CH1X5GAIN LED 1
CH2X5GAIN LED 2
CH2 INV LED 3
CH2 INV 4
P1
R1 620
R2 390
R3 390
R4 390
R5 390
R6 390
R7 620
R8 390
R9 390
R10 5.1K
R15 4.7K
R11 10K
R12 10K
R16 10K
C1 47 10V
C2
D1
Q1
Q2
IC2
10 9
11 8
12 7
13 6
14 5
15 4
16 3
17 2
18 1
P49-2
P49-1
CH2 UNCAL
CH1 UNCAL
P2
1 CH1
2 CH2
3 DUAL
4 ADD
5 ALT
6 XY
7
8 20MHzBW
9 BW LED
10 BEAM FINDER
11 5V
12 GND
IC1
IC2,3

SCHEMATIC DIAGRAM

CPU UNIT (X81-1320-00)

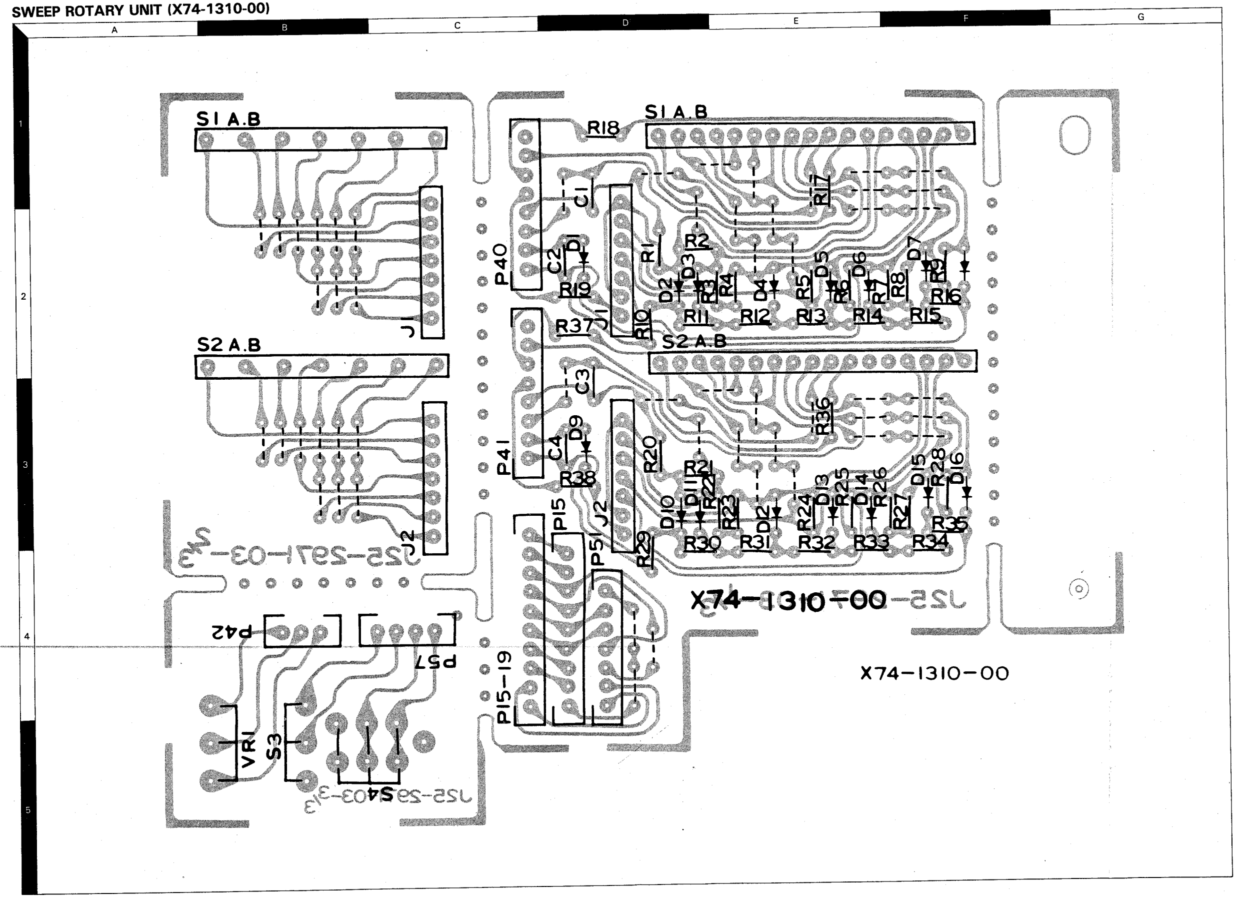

P62
26
25
CH1 x5 GAIN 24
CH 2 UNCAL 23
5V 22
K3 21
P3 20
CH1 19
P2 18
CH2 17
P1 16
DUAL 15
Po 14
ADD 13
R8 12
R9 11
QUAD 10
CH2 INV 9
20MHzBW 8
CH2 UNCAL 7
ALT 6
CH2x5 GAIN 5
K2 4
CHOP 3
BEAM FINDER 2
GND 1
CH1X5GAIN LED 1
CH2X5GAIN LED 2
CH2 INV LED 3
CH2 INV 4
P1
R1 620
R2 390
R3 390
R4 390
R5 390
R6 390
R7 620
R8 390
R9 390
R15 4.7K
R10 5.1K
R11 10K
R12 10K
R13 10K
R14 10K
R16 10K
C1 47 10V
C2 82P
C3 2.2 50V
C4 .1
C5 .1
D1
D2
D3
D4
Q1
Q2
IC1
1 EXTAL
2 XTAL
3 RESET
4 IRQ.
5 SO
6 SI
7 SC/TO
8 TC
9 Po
10 P1
11 P2
12 P3
13 O0
14 O1
15 O2
16 O3
17 O4
18 O5
19 O6
20 O7
21 Vss
Vcc 42
K3 41
K2 40
K1 39
Ko 38
STBY 37
R14 36
R13 35
R12 34
R11 33
R10 32
R9 31
R8 30
R7 29
R6 28
R5 27
R4 26
R3 25
R2 24
R1 23
Ro 22
IC2
IC3
P61
1 Po
2 P1
3 P2
4 P3
5 K2
6 K1
7 Ko
8 SINGLE
9 NORM
10 AUTO
11 DUAL
12 B
13 A-INT-B
14 ALT
15 A
16 XY
P49-2
P49-1
CH2 UNCAL
CH1 UNCAL
P2
1 CH1
2 CH2
3 DUAL
4 ADD
5 ALT
6 XY
7
8 20MHz BW
9 BW LED
10 BEAM FINDER
11 5V
12 GND

IC1 : MTM-5010
IC2,3 : AN90B20

Q1 : 2SA1309(Q,R)
Q2 : 2SC3311(R)
D1,2,3,4 : GMA-01

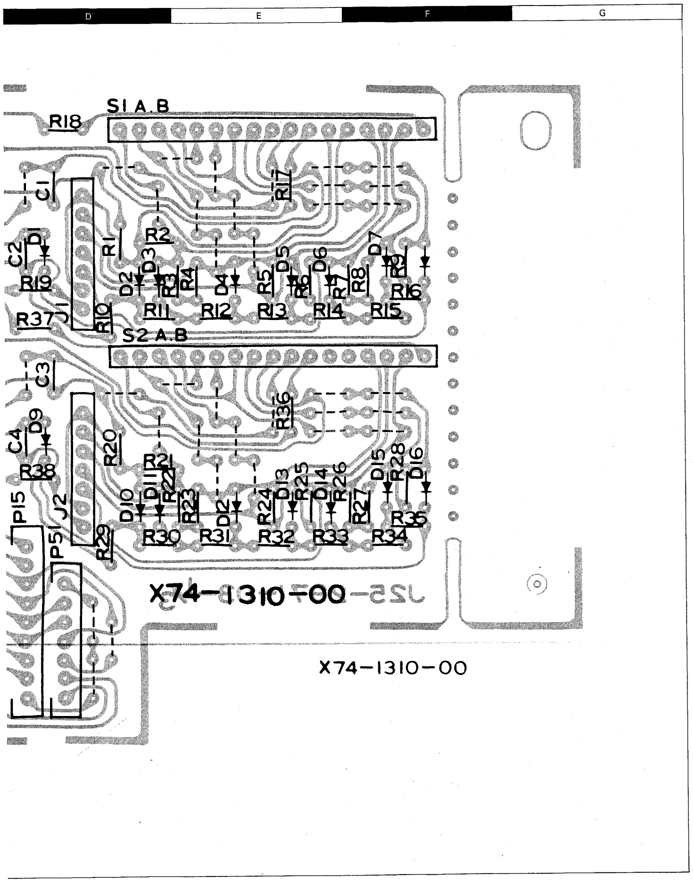
PC BOARD

SWEEP ROTARY UNIT (X74-1310-00)

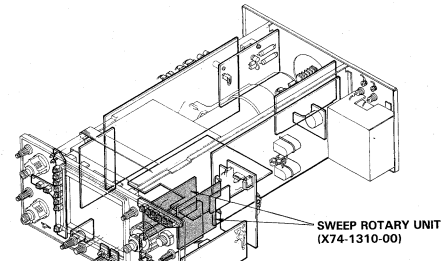


A
B
C
D
E
F
G
1
2
3
4
5
S1 A.B
S2 A.B
J1
J2
P40
P41
P15
P51
P15–19
P42
P57
VR1
S3
S4
C1
C2
C3
C4
D1
D2
D3
D4
D5
D6
D7
D9
D10
D11
D12
D13
D14
D15
D16
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
X74-1310-00
X74-1310-00

PC BOARD


D
E
F
G
S1 A.B
S2 A.B
R18
R17
R36
C1
C2
C3
C4
D1
D2
D3
D4
D5
D6
D7
D9
D10
D11
D12
D13
D14
D15
D16
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R37
R38
J1
J2
P15
P51
X74-1310-00

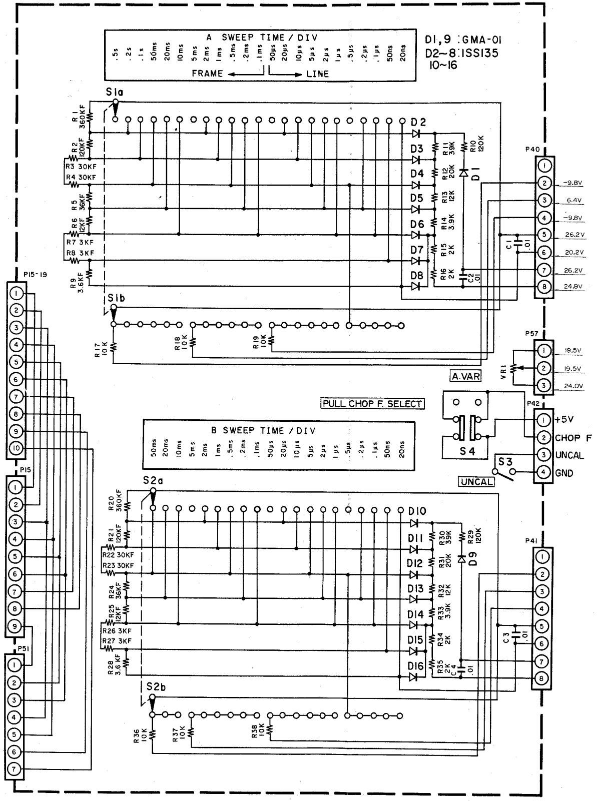
X74-1310-00


SWEEP ROTARY UNIT
(X74-1310-00)

WAVEFORMS

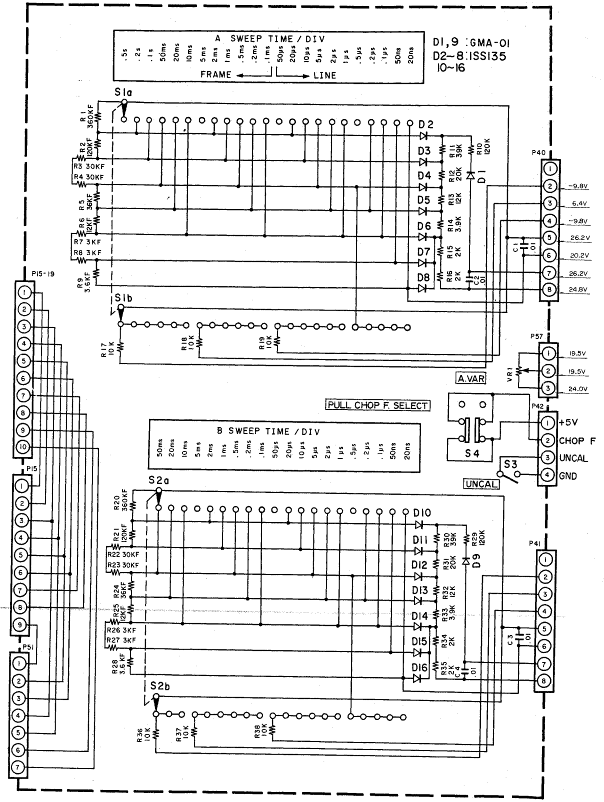
SCHEMATIC DIAGRAM

SWEEP ROTARY UNIT (X74-1310-00)


A SWEEP TIME / DIV
.5s .2s .1s 50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50μs 20μs 10μs 5μs 2μs 1μs .5μs .2μs .1μs 50ns 20ns
FRAME
LINE
D1,9 :GMA-01
D2~8 :1SS135
10~16
S1a
R1 360KF
R2 120KF
R3 30KF
R4 30KF
R5 36KF
R6 12KF
R7 3KF
R8 3KF
R9 3.6KF
D2
D3
D4
D5
D6
D7
D8
D1
R10 120K
R11 39K
R12 20K
R13 12K
R14 3.9K
R15 2K
R16 2K
C1 .01
C2 .01
S1b
R17 10K
R18 10K
R19 10K
P40
-9.8V
6.4V
-9.8V
26.2V
20.2V
26.2V
24.8V
P57
19.5V
19.5V
24.0V
VR1
A.VAR
PULL CHOP F. SELECT
S4
P42
+5V
CHOP F
UNCAL
GND
S3
UNCAL
B SWEEP TIME / DIV
50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50μs 20μs 10μs 5μs 2μs 1μs .5μs .2μs .1μs 50ns 20ns
S2a
R20 360KF
R21 120KF
R22 30KF
R23 30KF
R24 36KF
R25 12KF
R26 3KF
R27 3KF
R28 3.6KF
D10
D11
D12
D13
D14
D15
D16
D9
R29 120K
R30 39K
R31 20K
R32 12K
R33 3.9K
R34 2K
R35 2K
C3 .01
C4 .01
P41
S2b
R36 10K
R37 10K
R38 10K
P15-19
P15
P51

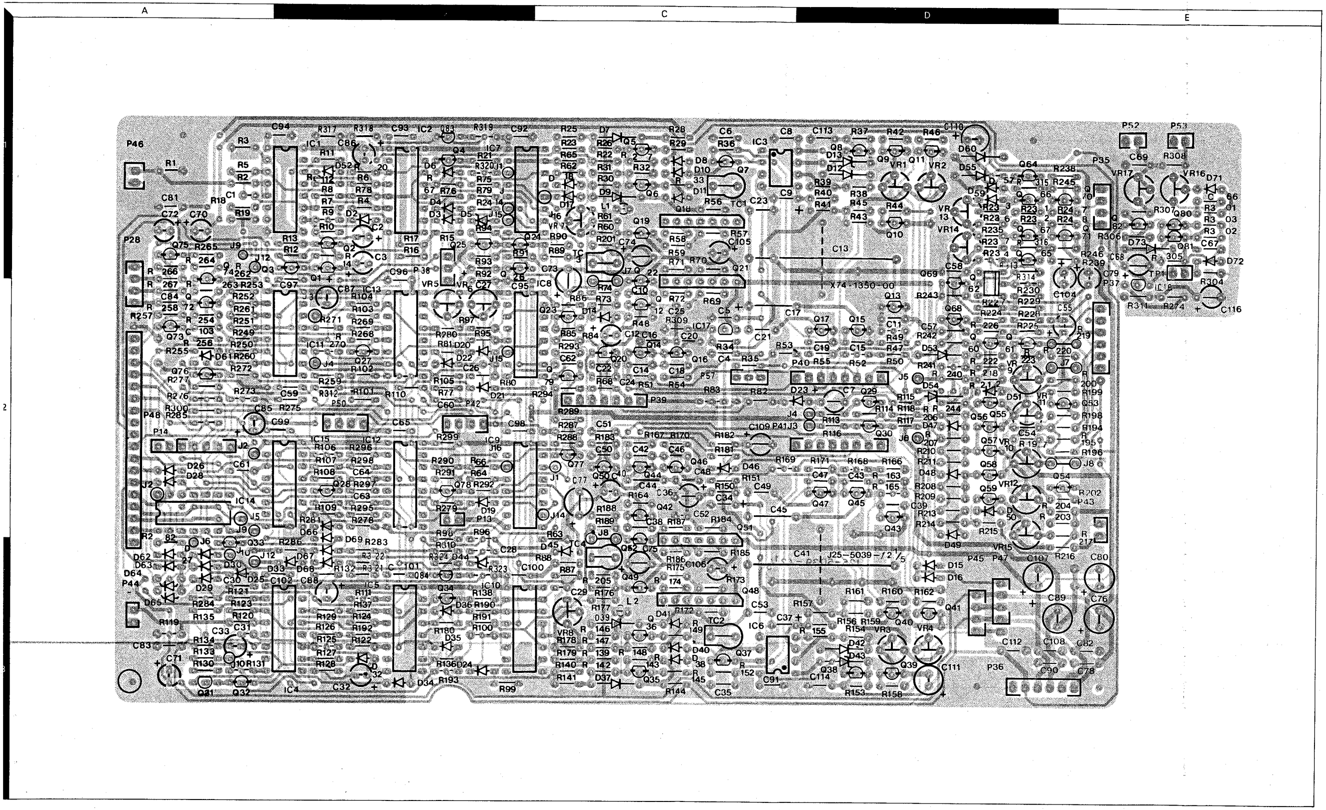
SCHEMATIC DIAGRAM

SWEEP ROTARY UNIT (X74-1310-00)

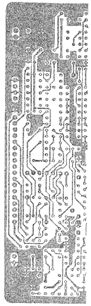

A SWEEP TIME / DIV
.5s .2s .1s 50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50µs 20µs 10µs 5µs 2µs 1µs .5µs .2µs .1µs 50ns 20ns
FRAME
LINE
D1,9 :GMA-01
D2~8 :1SS135
10~16
S1a
S1b
R1 360KF
R2 120KF
R3 30KF
R4 30KF
R5 36KF
R6 12KF
R7 3KF
R8 3KF
R9 3.6KF
D2
D3
D4
D5
D6
D7
D8
D1
R10 120K
R11 39K
R12 20K
R13 12K
R14 3.9K
R15 2K
R16 2K
C1 .01
C2 .01
R17 10K
R18 10K
R19 10K
P40
-9.8V
6.4V
-9.8V
26.2V
20.2V
26.2V
24.8V
P57
19.5V
19.5V
24.0V
VR1
A.VAR
PULL CHOP F. SELECT
P42
+5V
CHOP F
UNCAL
GND
S4
S3
UNCAL
P15-19
P15
P51
B SWEEP TIME / DIV
50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50µs 20µs 10µs 5µs 2µs 1µs .5µs .2µs .1µs 50ns 20ns
S2a
S2b
R20 360KF
R21 120KF
R22 30KF
R23 30KF
R24 36KF
R25 12KF
R26 3KF
R27 3KF
R28 3.6KF
D10
D11
D12
D13
D14
D15
D16
D9
R29 120K
R30 39K
R31 20K
R32 12K
R33 3.9K
R34 2K
R35 2K
C3 .01
C4 .01
R36 10K
R37 10K
R38 10K
P41

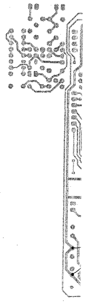
PC BOARD

RIG SWEEP UNIT (X74-1350-00)

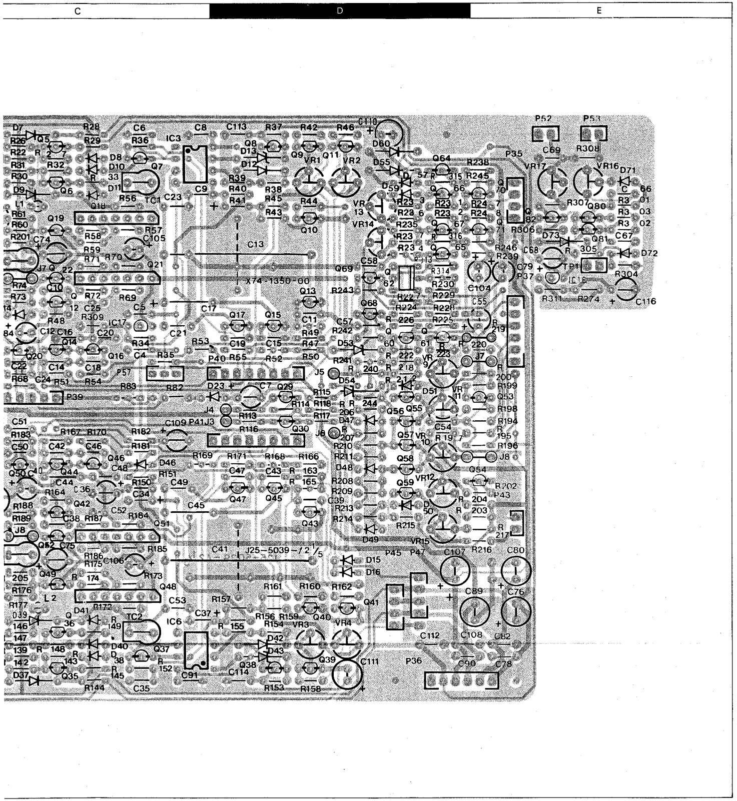


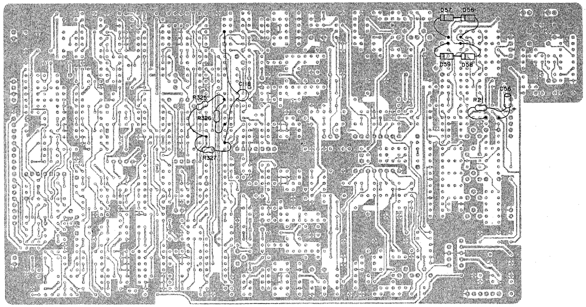
A
C
D
E
1
2
3
P46
R1
C81
C72
C70
P28
R257
P48
P14
J2
P44
D62
D63
D64
D65
R119
C83
C71
Q31
Q32
C94
IC1
R317
C86
R318
C93
IC2
Q83
R319
C92
IC7
IC13
C87
C97
C96
P38
VR5
VR6
C27
C95
IC8
IC11
D61
IC15
IC12
C65
P50
C99
C85
IC14
C102
C88
IC5
IC4
C32
D34
R193
R99
IC9
C98
IC10
C100
C28
D44
R25
D7
R28
C6
R36
IC3
C8
C113
R37
R42
R46
C110
D60
VR1
VR2
Q7
TC1
C23
C9
C13
X74-1350-00
Q21
C105
C17
C21
P39
P57
P40
C109
P41
J3
J4
C41
J25-5039-12/5
TC2
IC6
C91
C114
VR3
VR4
Q39
C111
VR7
VR8
TC4
L1
L2
C77
J1
J14
P45
P47
P36
C112
C107
C80
C89
C76
C108
C82
C90
C78
P52
P53
C69
R308
VR16
VR17
D71
D72
R307
Q80
Q81
C67
C68
TP1
IC16
R304
C116
R311
R274
C79
P37
C104
C55
C58
VR9
VR10
VR11
VR12
VR13
VR14
VR15
D51
C54
Q53
J8
R202
P43
R216
R217
D15
D16
Q41


(COMPONENT

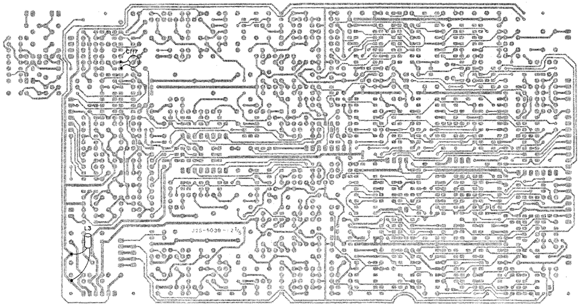

(FOIL SIDE VI

PC BOARD

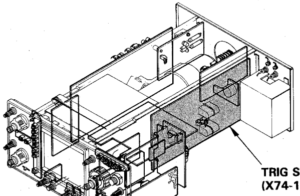

C
D
E
X74-1350-00
J25-5039-72 1/5
IC3
IC6
IC17
TC1
TC2
P35
P36
P37
P39
P40
P41
P43
P45
P47
P52
P53
P57
VR1
VR2
VR3
VR4
VR9
VR10
VR11
VR12
VR13
VR14
VR15
VR16
VR17
TP1
J4
J5
J6
J7
J8
C13
C41
C45
C116


D57
D56
D59
D58
C118
R325
R326
R327
R21
C65

(COMPONENT SIDE VIEW)

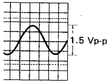

C117
L3
J25-5039-72 1/5

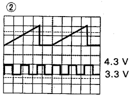
(FOIL SIDE VIEW)

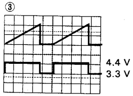


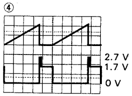
TRIG SWEEP UNIT
(X74-1350-00)

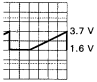
WAVEFORMS

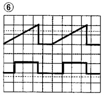


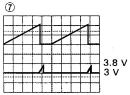


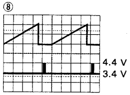


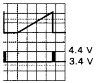


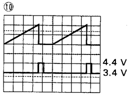


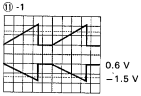


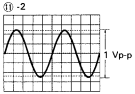




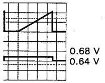




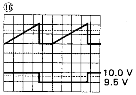




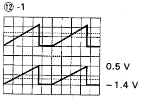
Input: CH2,
H DISPLAY: X-Y

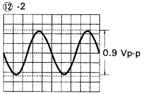


ISPLAY: ALT
: SEP: Fully CCW

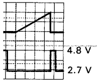


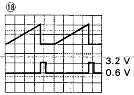
HORIZ DISPLAY: ALT
▲▼TRACE SEP: Fully CCW

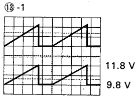


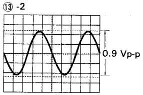


Input: CH2,
H DISPLAY: X-Y

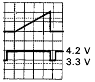


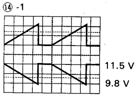


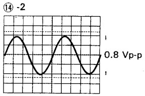




Input: CH2,
H DISPLAY: X-Y



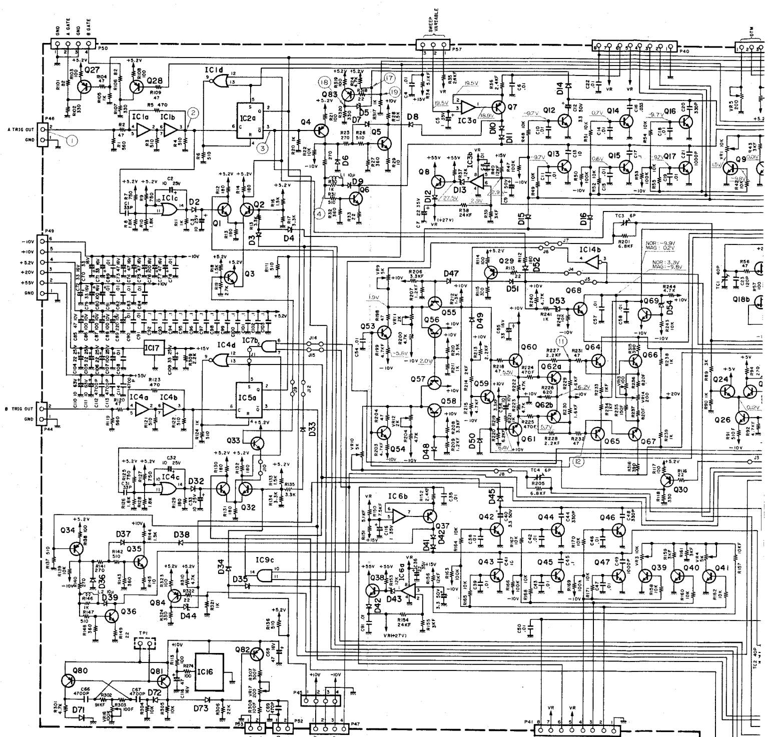




Input: CH2,
H DISPLAY: X-Y

SCHEMATIC DIAGRAM

TRIG SWEEP UNIT (X74-1350-00)


P50
GND
A GATE
GND
B GATE
SWEEP VARIABLE
P57
P40
P46
A TRIG OUT
GND
P49
−10V
+10V
+5.2V
+20V
+55V
GND
P44
B TRIG OUT
GND
Q27
Q28
IC1d
IC1a
IC1b
IC2a
IC1c
IC4d
IC4a
IC4b
IC4c
IC5a
IC7b
IC17
IC3a
IC3b
IC14b
IC6b
IC6a
IC9c
IC16
Q83
Q4
Q5
Q6
Q7
Q8
Q12
Q13
Q14
Q15
Q16
Q17
Q1
Q2
Q3
Q29
Q53
Q54
Q55
Q56
Q57
Q58
Q59
Q60
Q61
Q62a
Q62b
Q64
Q65
Q66
Q67
Q68
Q69
Q30
Q24
Q26
Q33
Q32
Q34
Q35
Q36
Q84
Q37
Q38
Q42
Q43
Q44
Q45
Q46
Q47
Q39
Q40
Q41
Q80
Q81
Q82
TP1
P43
P45
P52
P47
P53
P41
GND
ICAL
GND
VCAL
+10V
GND
−10V
VIDEO

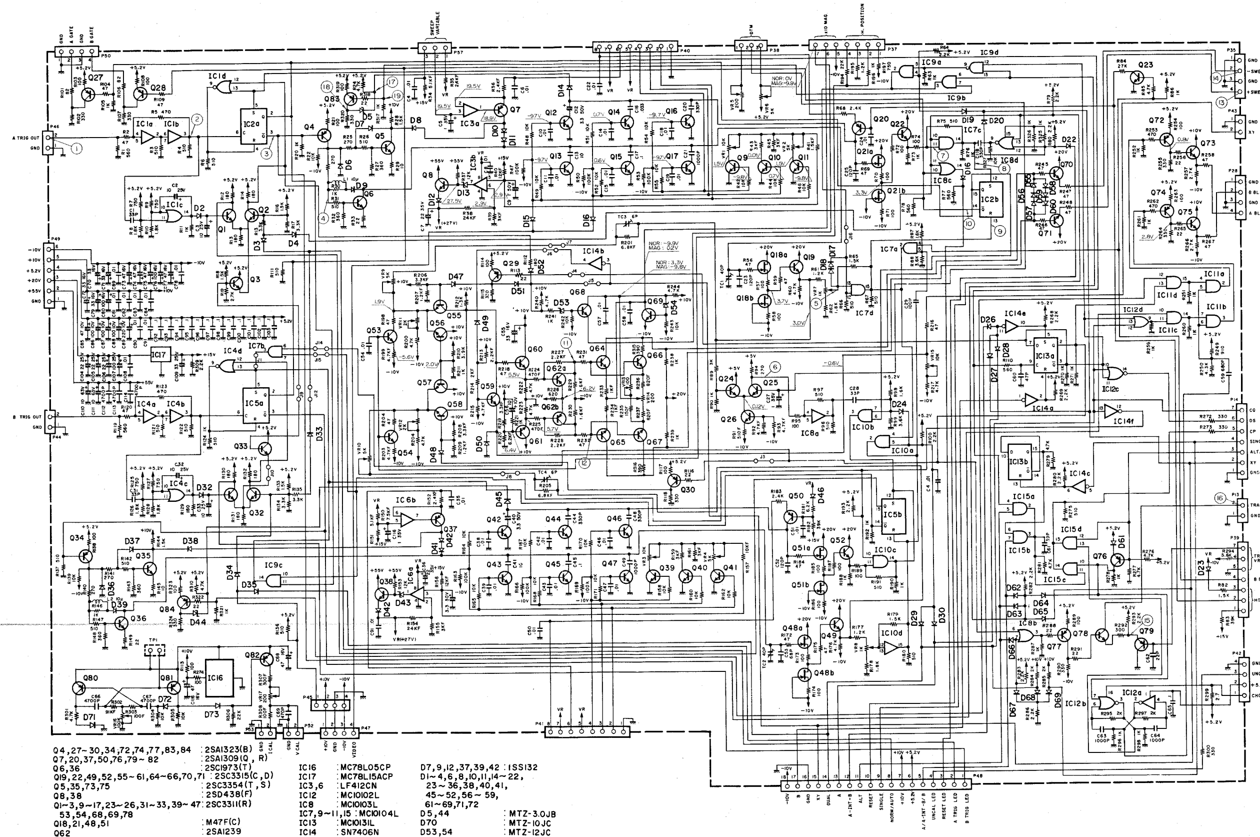
Q4,27~30,34,72,74,77,83,84	:2SA1323(B)
Q7,20,37,50,76,79~82	:2SA1309(Q, R)
Q6,36	:2SC1973(T)
Q19,22,49,52,55~61,64~66,70,71	:2SC3315(C,D)
Q5,35,73,75	:2SC3354(T,S)
Q8,38	:2SD438(F)
Q1~3,9~17,23~26,31~33,39~47 53,54,68,69,78	:2SC3311(R)
Q18,21,48,51	:M47F(C)
Q62	:2SA1239

IC16	:MC78L05CP
IC17	:MC78L15ACP
IC3,6	:LF412CN
IC12	:MC10102L
IC8	:MC10103L
IC7,9~11,15	:MC10104L
IC13	:MC10131L
IC14	:SN7406N
IC1,4	:MC10H103L
IC2,5	:MC10H131L

D7,9,12,37,39,42	:1SS132
D1~4,6,8,10,11,14~22, 23~36,38,40,41, 45~52,56~59, 61~69,71,72	
D5,44	:MTZ-3.0JB
D70	:MTZ-10JC
D53,54	:MTZ-12JC
D13,43	:MTZ-15JC
D55,60	:SV06Y
D73	:1N60

SCHEMATIC DIAGRAM

TRIG SWEEP UNIT (X74-1350-00)


P50
GND
A GATE
GND
B GATE
SWEEP VARIABLE
P57
P40
DTM
P38
X10 MAG
H. POSITION
P37
P35
GND
-SWEEP
GND
+SWEEP
P43
GND
XY
P28
GND
B BLANKING
GND
A BLANKING
P46
A TRIG OUT
GND
P49
-10V
+10V
+5.2V
+20V
+55V
GND
P44
B TRIG OUT
GND
P14
CG
DS
CP
SINGLE/PLU
ALT/CHOP
XY
GND
P13
TRACE SEP
GND
P39
TRACE SEP VR
B ENDS A
HOLD OFF
P42
GND
UNCAL
+5.2V
CHOP F
P53
GND
I CAL
P52
GND
V CAL
P45
P47
+10V
GND
-10V
VIDEO
P41
P48
-10V
B
GND
XY
DUAL
A
A-INT-B
ALT
RESET
SINGLE
NORM/AUTO
+10V
+5.2V
A/A-INT-B/B
UNCAL LED
RESET LED
A TRIG LED
B TRIG LED

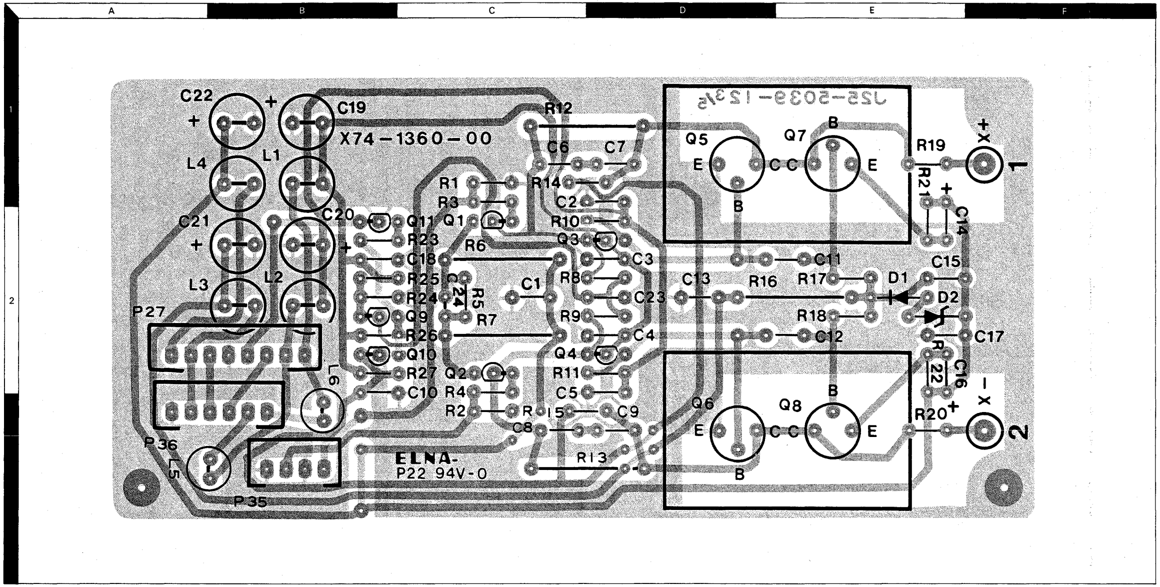
Q4,27~30,34,72,74,77,83,84 :2SA1323(B)
Q7,20,37,50,76,79~82 :2SA1309(Q , R)
Q6,36 :2SC1973(T)
Q19,22,49,52,55~61,64~66,70,71 :2SC3315(C,D)
Q5,35,73,75 :2SC3354(T,S)
Q8,38 :2SD438(F)
Q1~3,9~17,23~26,31~33,39~47 :2SC3311(R)
53,54,68,69,78
Q18,21,48,51 :M47F(C)
Q62 :2SA1239

IC16 :MC78L05CP
IC17 :MC78L15ACP
IC3,6 :LF412CN
IC12 :MC10102L
IC8 :MC10103L
IC7,9~11,15 :MC10104L
IC13 :MC10131L
IC14 :SN7406N
IC1,4 :MC10H103L
IC2,5 :MC10H131L

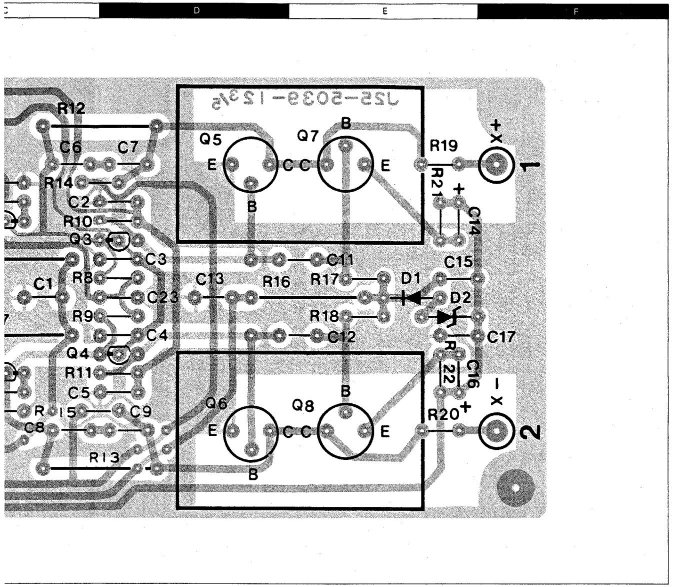
D7,9,12,37,39,42 :1SS132
D1~4,6,8,10,11,14~22,
23~36,38,40,41,
45~52,56~59,
61~69,71,72
D5,44 :MTZ-3.0JB
D70 :MTZ-10JC
D53,54 :MTZ-12JC
D13,43 :MTZ-15JC
D55,60 :SV06Y
D73 :1N60

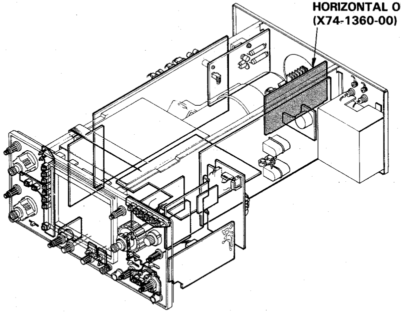
PC BOARD

HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)


A
B
C
D
E
F
1
2
X74-1360-00
J25-5039-12 3/5
ELNA-
P22 94V-0
C22
C19
C21
C20
L4
L1
L3
L2
L5
L6
P27
P36
P35
R12
C6
C7
R1
R3
R14
C2
Q11
Q1
R10
R23
Q3
C18
R6
C3
R25
C24
R5
C1
R8
R24
C23
Q9
R7
R9
R26
C4
Q10
Q4
R27
Q2
R11
C10
R4
C5
R2
R15
C9
C8
R13
Q5
Q7
Q6
Q8
B
E
C
R19
R21
C14
C11
C15
C13
R16
R17
D1
D2
R18
C12
C17
R22
C16
R20
+X
1
-X
2

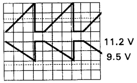
PC BOARD


D
E
F
J25-5039-12
R12
C6
C7
R14
C2
R10
Q3
C3
R8
C1
C23
R9
C4
Q4
R11
C5
R15
C9
C8
R13
C13
R16
R17
R18
C11
C12
Q5
Q7
Q6
Q8
E
C
B
D1
D2
C15
C17
R19
R21
C14
R22
C16
R20
+X
1
-X
2

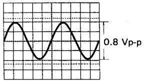

HORIZONTAL OUTPUT AMP UNIT
(X74-1360-00)

WAVEFORMS

①-1

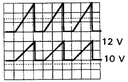


①-2

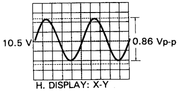


H. DISPLAY: X-Y

②-1

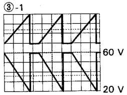


②-2

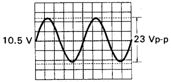


H. DISPLAY: X-Y

③-1

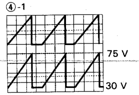


③-2

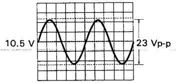


H. DISPLAY: X-Y

④-1



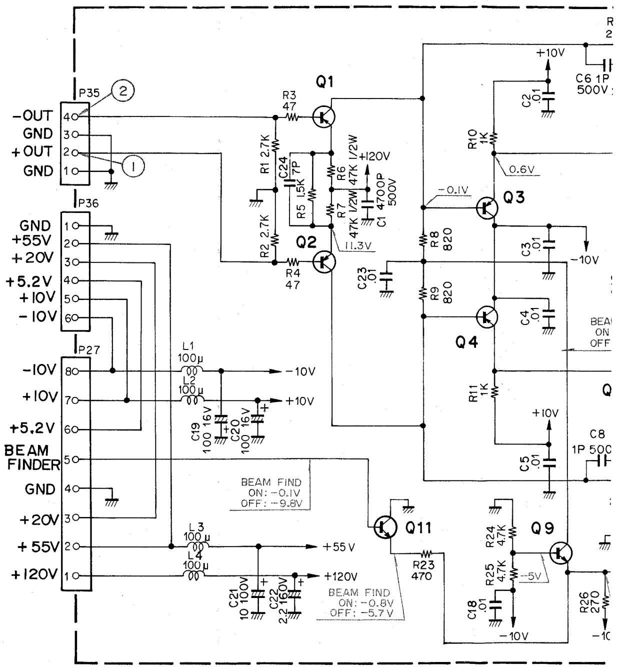
④-2



H. DISPLAY: X-Y

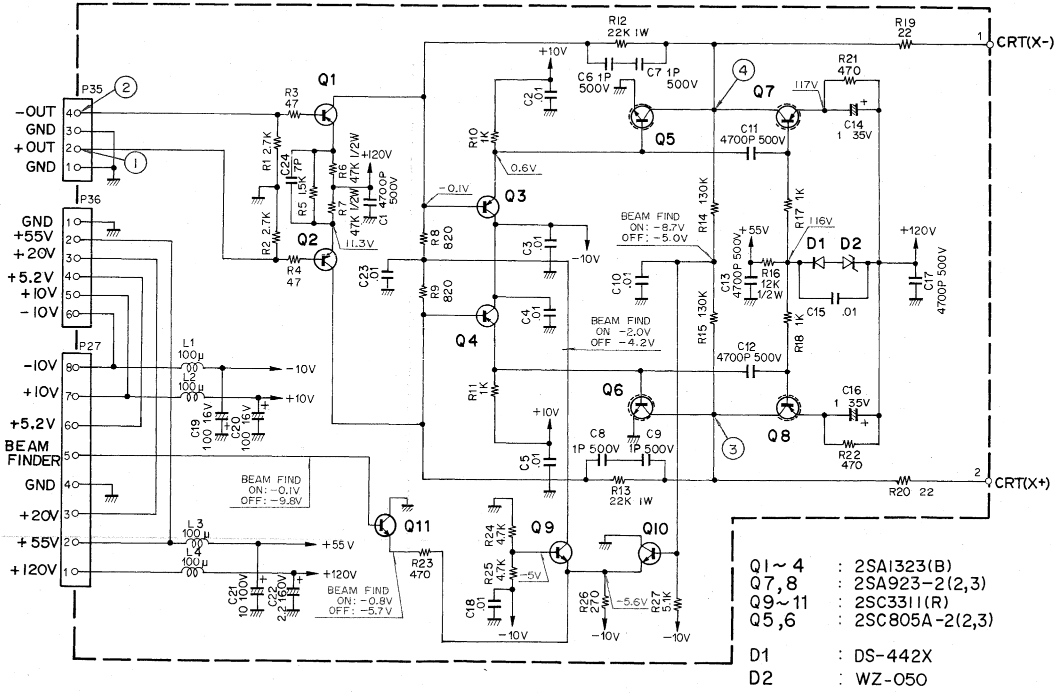
SCHEMATIC DIAGRAM

HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)


P35
②
①
−OUT
GND
+OUT
GND
P36
GND
+55V
+20V
+5.2V
+10V
−10V
P27
−10V
+10V
+5.2V
BEAM FINDER
GND
+20V
+55V
+120V
L1 100μ
L2 100μ
−10V
+10V
C19 100 16V
C20 100 16V
L3 100μ
L4 100μ
+55V
+120V
C21 10 100V
C22 2.2 160V
BEAM FIND ON: −0.1V OFF: −9.8V
BEAM FIND ON: −0.8V OFF: −5.7V
Q1
Q2
R3 47
R4 47
R1 2.7K
R2 2.7K
C24 7P
R5 1.5K
R6 47K 1/2W
R7 47K 1/2W
+120V
C1 4700P 500V
11.3V
C23 .01
R8 820
R9 820
−0.1V
Q3
Q4
+10V
C2 .01
C6 1P 500V
R10 1K
0.6V
C3 .01
−10V
C4 .01
BEAM ON OFF
R11 1K
+10V
C5 .01
C8 1P 500
Q11
R23 470
Q9
R24 4.7K
R25 4.7K
−5V
C18 .01
−10V
R26 270
−10

SCHEMATIC DIAGRAM

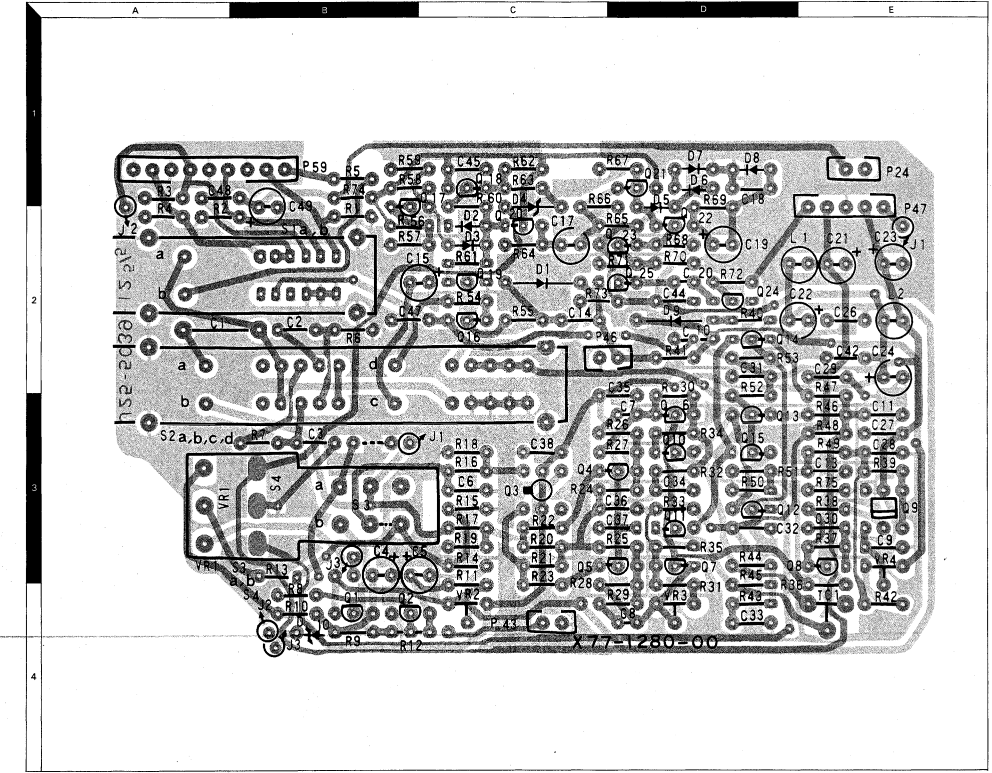
HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)


P35
-OUT
GND
+OUT
GND
P36
GND
+55V
+20V
+5.2V
+10V
-10V
P27
-10V
+10V
+5.2V
BEAM FINDER
GND
+20V
+55V
+120V
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
R1 2.7K
R2 2.7K
R3 47
R4 47
R5 1.5K
R6 47K 1/2W
R7 47K 1/2W
R8 820
R9 820
R10 1K
R11 1K
R12 22K 1W
R13 22K 1W
R14 130K
R15 130K
R16 12K 1/2W
R17 1K
R18 1K
R19 22
R20 22
R21 470
R22 470
R23 470
R24 4.7K
R25 4.7K
R26 270
R27 5.1K
C1 4700P 500V
C2 .01
C3 .01
C4 .01
C5 .01
C6 1P 500V
C7 1P 500V
C8 1P 500V
C9 1P 500V
C10 .01
C11 4700P 500V
C12 4700P 500V
C13 4700P 500V
C14 1 35V
C15 .01
C16 1 35V
C17 4700P 500V
C18 .01
C19 100 16V
C20 100 16V
C21 10 100V
C22 2.2 160V
C23 .01
C24 7P
L1 100μ
L2 100μ
L3 100μ
L4 100μ
D1
D2
+120V
+10V
-10V
+55V
+5.2V
-0.1V
0.6V
11.3V
117V
116V
-5V
-5.6V
BEAM FIND ON: -8.7V OFF: -5.0V
BEAM FIND ON -2.0V OFF -4.2V
BEAM FIND ON: -0.1V OFF: -9.8V
BEAM FIND ON: -0.8V OFF: -5.7V
CRT(X-)
CRT(X+)
1
2
①
②
③
④

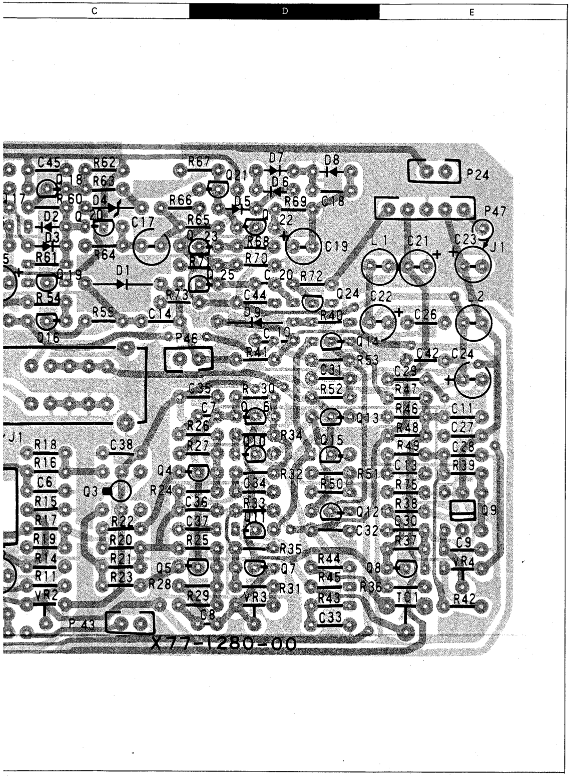
Q1～4 : 2SA1323(B)
Q7,8 : 2SA923-2(2,3)
Q9～11 : 2SC3311(R)
Q5,6 : 2SC805A-2(2,3)
D1 : DS-442X
D2 : WZ-050

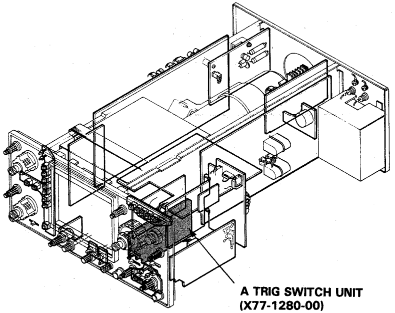
PC BOARD

A TRIG SWITCH UNIT (X77-1280-00)


A
B
C
D
E
1
2
3
4
P59
R5
R74
R1
R3
R4
C48
R2
C49
J2
S1a,b
R59
R58
R56
R57
Q17
C45
Q18
R60
D2
D3
R62
R63
D4
Q20
R61
R64
Q19
R54
C15
C47
Q16
R55
D1
R67
R66
C17
R65
Q23
R71
Q25
R73
C14
P46
Q21
D7
D6
D5
D8
R69
C18
Q22
R68
R70
C19
C20
R72
C44
D9
C10
R40
R41
Q24
P24
P47
L1
C21
C23
J1
C22
C26
L2
Q14
R53
C42
C24
C29
R47
R46
R48
R49
C13
R75
R38
C30
R37
Q8
IC1
R36
R42
VR4
C9
Q9
C39
C28
C27
C11
C31
R52
Q13
Q15
R50
R51
Q12
C32
R44
R45
R43
C33
C35
C7
R30
Q6
R26
R27
R34
Q10
C34
C36
C37
R25
R33
Q11
R32
R35
Q7
R31
VR3
R29
C8
R28
Q5
Q4
R24
Q3
C38
R22
R20
R21
R23
R18
R16
C6
R15
R17
R19
R14
R11
VR2
P43
X77-1280-00
C1
C2
R6
a
b
c
d
S2a,b,c,d
R7
C3
J1
VR1
S4
S3
J3
C4
C5
R13
R8
R10
Q1
Q2
D10
R9
R12
J2
J3
VR1
S3
a,b
S4
X52-2030-15 2/2

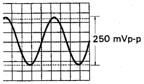
PC BOARD


C
D
E
C45
R62
R63
Q18
R60
D4
Q20
D2
D3
R61
R64
Q19
D1
R54
R55
C14
Q16
R67
Q21
D7
D8
D6
R66
D5
R69
C18
Q22
R65
Q23
R68
R70
C17
C19
R71
Q25
C20
R72
R73
C44
D9
C10
R40
Q24
P24
P47
L1
C21
C23
J1
C22
C26
L2
Q14
P46
R41
R53
C42
C24
C31
R52
C29
R47
R46
C11
C27
C35
R30
C7
Q6
Q13
R48
R26
R27
Q10
R34
Q15
R49
C28
R39
C13
J1
R18
R16
C38
C6
R15
Q3
Q4
R24
C36
R33
C34
R32
R50
R51
R75
R38
Q9
Q12
C30
C32
R17
R22
C37
Q11
R19
R20
R25
R35
R37
C9
R14
R21
Q5
Q7
R44
Q8
VR4
R11
R23
R28
R29
R45
R31
R36
VR2
VR3
R43
TC1
R42
C8
C33
P43
X77-1280-00

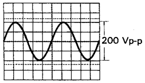


A TRIG SWITCH UNIT
(X77-1280-00)

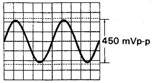
WAVEFORMS



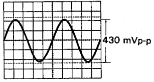
②

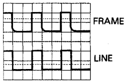


③

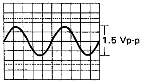


④



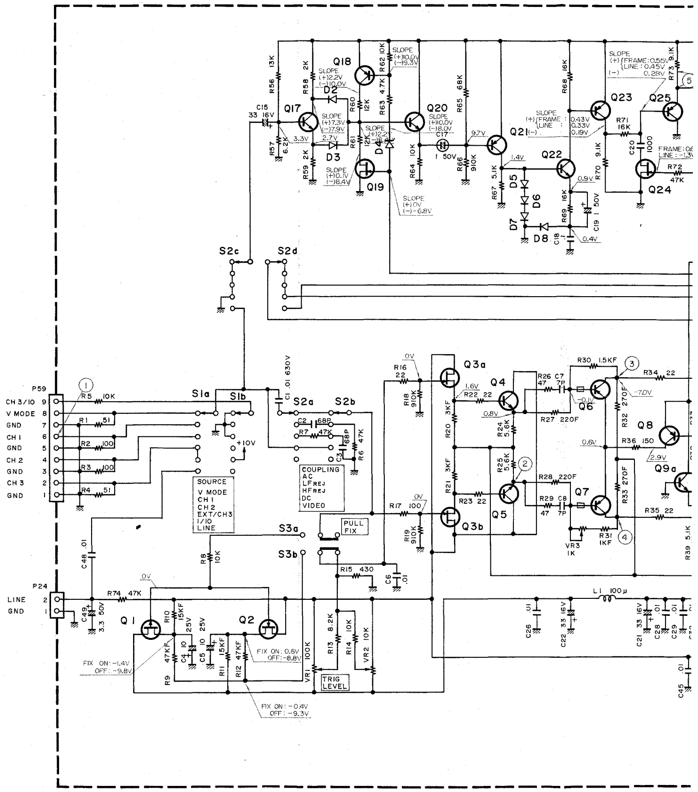


⑥



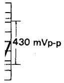
SCHEMATIC DIAGRAM

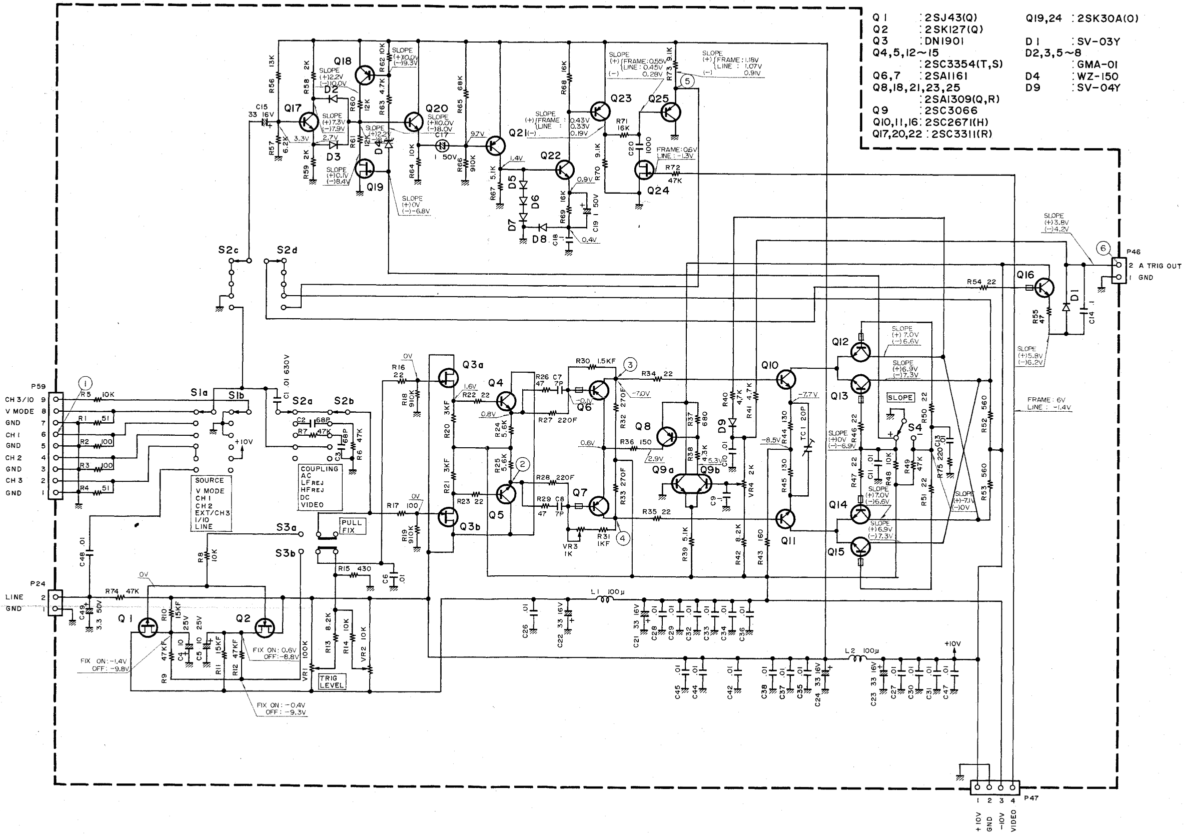
A TRIG SWITCH UNIT (X77-1280-00)


P59
CH 3/10
V MODE
GND
CH 1
GND
CH 2
GND
CH 3
GND
P24
LINE
GND
S1a
S1b
SOURCE
V MODE
CH 1
CH 2
EXT/CH3
1/10
LINE
S2a
S2b
S2c
S2d
COUPLING
AC
LF REJ
HF REJ
DC
VIDEO
S3a
S3b
PULL
FIX
TRIG
LEVEL
Q1
Q2
Q3a
Q3b
Q4
Q5
Q6
Q7
Q8
Q9a
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
D2
D3
D4
D5
D6
D7
D8
L1 100µ
VR1 100K
VR2 10K
VR3 1K
SLOPE
FIX ON: -1.4V
OFF: -9.8V
FIX ON: 0.6V
OFF: -8.8V
FIX ON: -0.4V
OFF: -9.3V
FRAME
LINE

SCHEMATIC DIAGRAM

A TRIG SWITCH UNIT (X77-1280-00)

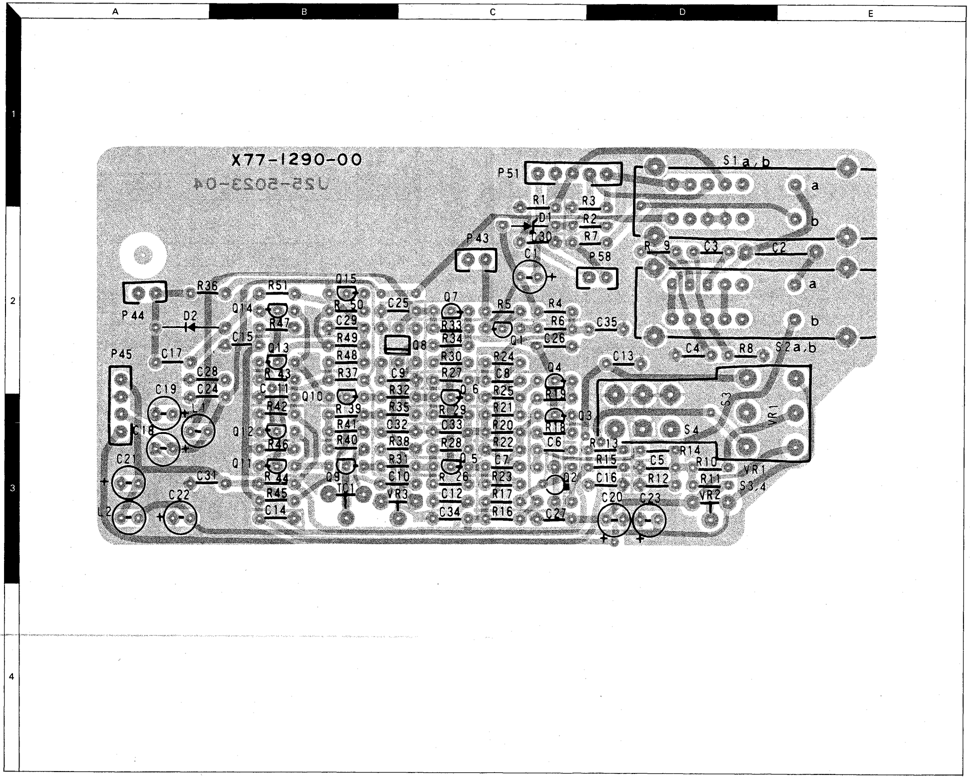


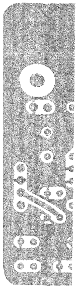

P59
CH 3/10 9
V MODE 8
GND 7
CH 1 6
GND 5
CH 2 4
GND 3
CH 3 2
GND 1
SOURCE
V MODE
CH 1
CH 2
EXT/CH3
1/10
LINE
COUPLING
AC
LFREJ
HFREJ
DC
VIDEO
PULL
FIX
TRIG
LEVEL
S1a
S1b
S2a
S2b
S2c
S2d
S3a
S3b
S4
SLOPE
P24
LINE 2
GND 1
FIX ON: -1.4V
OFF: -9.8V
FIX ON: 0.6V
OFF: -8.8V
FIX ON: -0.4V
OFF: -9.3V
Q1
Q2
Q3a
Q3b
Q4
Q5
Q6
Q7
Q8
Q9a
Q9b
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
D1
D2
D3
D4
D5
D6
D7
D8
D9
L1 100μ
L2 100μ
+10V
P46
2 A TRIG OUT
1 GND
FRAME: 6V
LINE: -1.4V
P47
1 2 3 4
+10V
GND
-10V
VIDEO

Q1 :2SJ43(Q)
Q2 :2SK127(Q)
Q3 :DN1901
Q4,5,12~15 :2SC3354(T,S)
Q6,7 :2SA1161
Q8,18,21,23,25 :2SA1309(Q,R)
Q9 :2SC3066
Q10,11,16: 2SC2671(H)
Q17,20,22 :2SC3311(R)
Q19,24 :2SK30A(O)
D1 :SV-03Y
D2,3,5~8 :GMA-01
D4 :WZ-150
D9 :SV-04Y

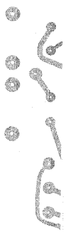
PC BOARD

B TRIG SWITCH UNIT (X77-1290-00)


A
B
C
D
E
1
2
3
4
X77-1290-00
P51
R1
R3
D1
R2
C30
R7
P43
C1
P58
S1a,b
a
b
R9
C3
C2
a
b
S2a,b
P44
R36
D2
Q14
C15
R51
Q15
R50
C29
R47
C25
Q7
R5
R4
R6
C35
R49
Q8
R33
R34
Q1
C26
C4
R8
P45
C17
Q13
R48
R30
R24
C13
C28
R43
R37
C9
R27
C8
Q4
C24
C19
C11
Q10
R42
R39
R32
Q6
R25
R19
S3
VR1
L1
R35
R29
R21
Q3
S4
C18
Q12
R41
C32
C33
R20
R18
R46
R40
R38
R28
R22
C6
R13
R14
C21
Q11
R31
Q5
C7
R15
C5
R10
VR1
C31
R44
Q9
TC1
C10
R26
R23
Q2
C16
R12
R11
S3,4
C22
R45
VR3
C12
R17
C20
C23
VR2
L2
C14
C34
R16
C27

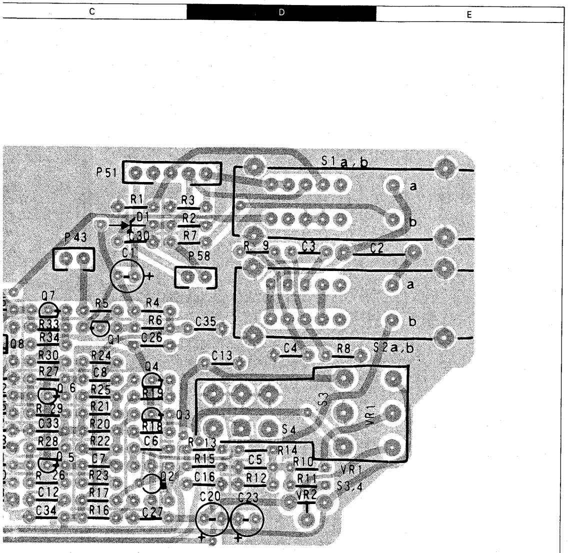


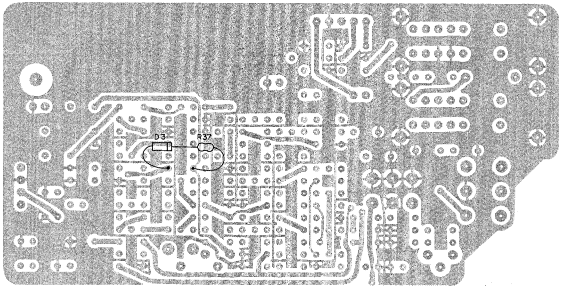
(COMPONENT



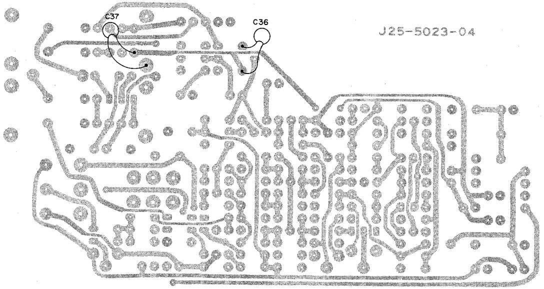
(FOIL SIDE VI

PC BOARD

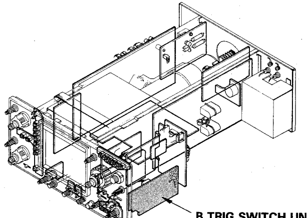

C
D
E
P51
S1a,b
a
b
R1
R3
D1
R2
C30
R7
P43
C1
P58
R 9
C3
C2
a
b
Q7
R5
R4
R6
C35
R33
R34
Q1
C26
Q8
R30
R24
C13
C4
R8
S2a,b
R27
C8
Q4
Q6
R25
R19
R29
R21
S3
VR1
C33
R20
R18
Q3
S4
R28
R22
C6
R 13
R14
Q5
C7
R15
C5
R10
R 26
R23
C16
R12
R11
VR1
S3,4
C12
R17
Q2
C20
C23
VR2
C34
R16
C27



(COMPONENT SIDE VIEW)

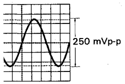

C37
C36
J25-5023-04

(FOIL SIDE VIEW)

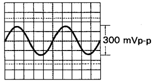


B TRIG SWITCH UNIT (X77-1290-00)

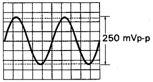
WAVEFORMS



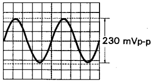
②

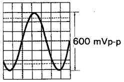


③

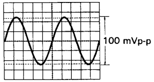


④

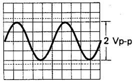




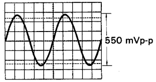
⑥



⑦

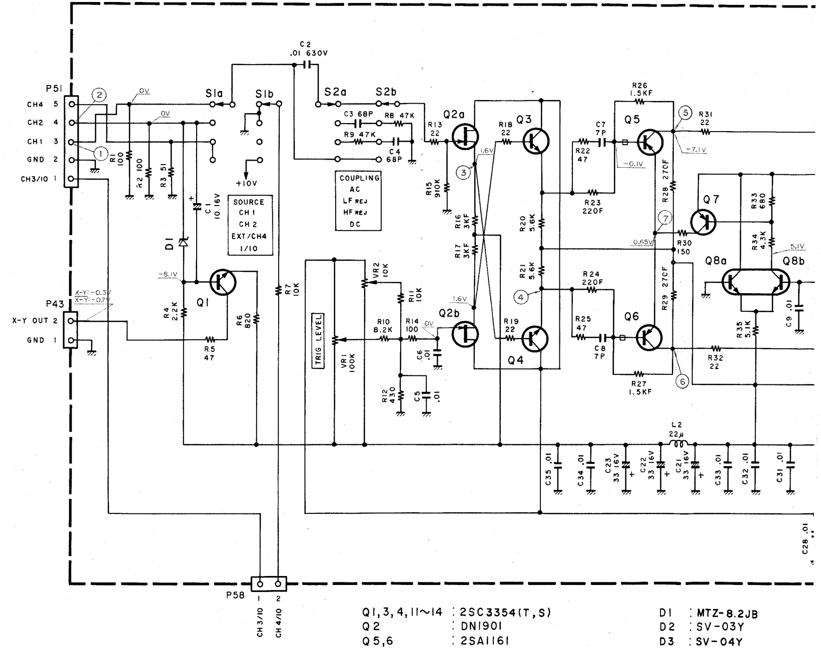


⑧



SCHEMATIC DIAGRAM

B TRIG SWITCH UNIT (X77-1290-00)


P51
CH4 5
CH2 4
CH1 3
GND 2
CH3/10 1
P43
X-Y OUT 2
GND 1
X-Y: -0.3V
X-Y: -0.7V
P58
1 2
CH3/10
CH4/10
S1a
S1b
S2a
S2b
C2 .01 630V
0V
R1 100
R2 100
R3 51
C1 10 16V
D1
-8.1V
Q1
R4 2.2K
R5 47
R6 820
R7 10K
+10V
SOURCE
CH 1
CH 2
EXT/CH4
1/10
COUPLING
AC
LF REJ
HF REJ
DC
C3 68P
R8 47K
R9 47K
C4 68P
TRIG LEVEL
VR1 100K
VR2 10K
R10 8.2K
R11 10K
R12 430
R13 22
R14 100
R15 910K
R16 3KF
R17 3KF
C5 .01
C6 .01
Q2a
Q2b
Q3
Q4
R18 22
R19 22
1.6V
R20 5.6K
R21 5.6K
R22 47
R23 220F
R24 220F
R25 47
R26 1.5KF
R27 1.5KF
C7 7P
C8 7P
Q5
Q6
-0.1V
-7.1V
R28 270F
R29 270F
R30 150
R31 22
R32 22
0.65V
Q7
R33 680
R34 4.3K
R35 5.1K
5.1V
Q8a
Q8b
C9 .01
L2 22μ
C35 .01
C34 .01
C23 33 16V
C22 33 16V
C21 33 16V
C33 .01
C32 .01
C31 .01
C28 .01
①
②
③
④
⑤
⑥
⑦

Q1, 3, 4, 11～14 : 2SC3354(T, S)
Q2 : DN1901
Q5, 6 : 2SA1161
Q7 : 2SA1309(Q, R)
Q8 : 2SC3066
Q9, 10, 15 : 2SC2671(H)

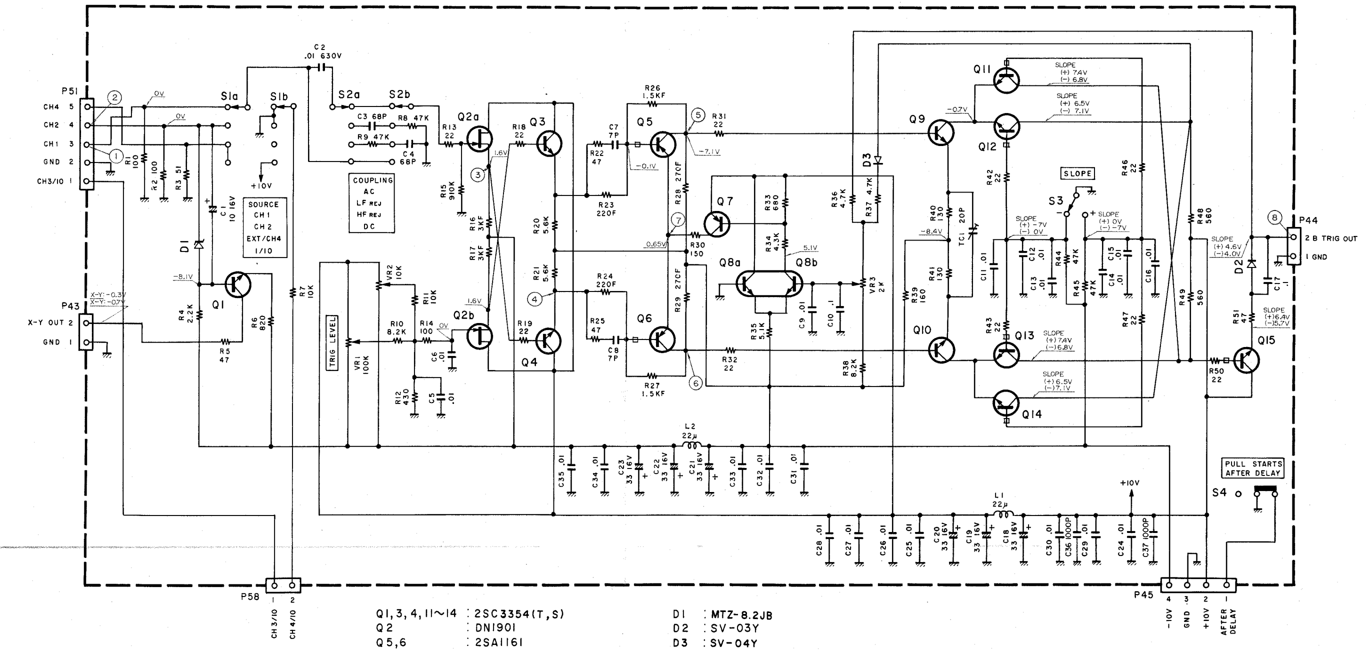
D1 : MTZ-8.2JB
D2 : SV-03Y
D3 : SV-04Y

SCHEMATIC DIAGRAM

B TRIG SWITCH UNIT (X77-1290-00)

0 mVp-p

0 mVp-p



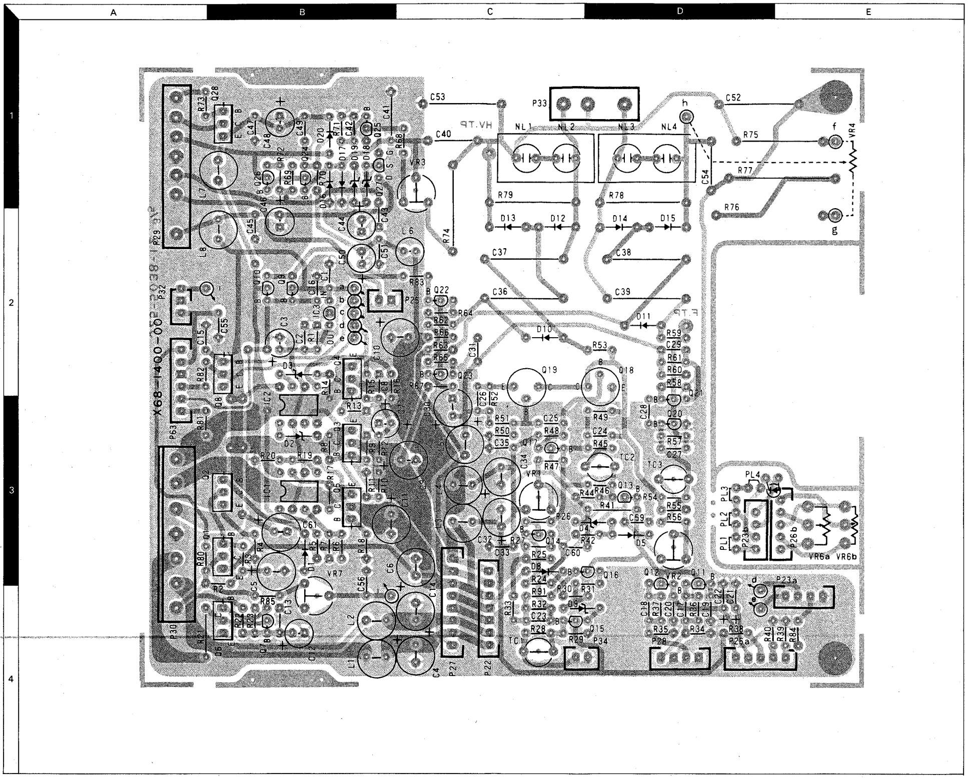
P51
CH4 5
CH2 4
CH1 3
GND 2
CH3/10 1
①
②
0V
0V
R1 100
R2 100
R3 51
C1 10 16V
D1
Q1
-8.1V
R4 2.2K
R5 47
R6 820
P43
X-Y OUT 2
GND 1
X-Y: -0.3V
X-Y: -0.7V
S1a
S1b
+10V
SOURCE
CH1
CH2
EXT/CH4
1/10
R7 10K
C2 .01 630V
S2a
S2b
C3 68P
R8 47K
R9 47K
C4 68P
COUPLING
AC
LF REJ
HF REJ
DC
TRIG LEVEL
VR1 100K
VR2 10K
R11 10K
R10 8.2K
R14 100
R12 430
C5 .01
C6 .01
0V
R13 22
R15 910K
Q2a
Q2b
③
1.6V
1.6V
R16 3KF
R17 3KF
R18 22
R19 22
Q3
Q4
R20 5.6K
R21 5.6K
④
R22 47
C7 7P
R23 220F
R24 220F
R25 47
C8 7P
R26 1.5KF
R27 1.5KF
Q5
Q6
-0.1V
-7.1V
⑤
⑥
⑦
R28 270F
R29 270F
0.65V
R30 150
R31 22
R32 22
Q7
R33 680
R34 4.3K
5.1V
Q8a
Q8b
R35 5.1K
C9 .01
C10 .1
VR3 2K
R36 4.7K
R37 4.7K
R38 8.2K
D3
Q9
Q10
-0.7V
-8.4V
R39 160
R40 130
R41 130
TC1 20P
C11 .01
Q11
Q12
Q13
Q14
SLOPE (+) 7.4V (-) 6.8V
SLOPE (+) 6.5V (-) 7.1V
SLOPE (+) 7.4V (-) 6.8V
SLOPE (+) 6.5V (-) 7.1V
R42 22
R43 22
C12 .01
C13 .01
SLOPE
S3
SLOPE (+) -7V (-) 0V
+ SLOPE (+) 0V (-) -7V
R44 47K
R45 47K
C14 .01
C15 .01
C16 .01
R46 22
R47 22
R48 560
R49 560
⑧
P44
2 B TRIG OUT
1 GND
SLOPE (+) 4.6V (-) 4.0V
D2
C17 .1
SLOPE (+) 6.4V (-) 5.7V
R51 47
Q15
R50 22
L2 22µ
C35 .01
C34 .01
C23 33 16V
C22 33 16V
C21 33 16V
C33 .01
C32 .01
C31 .01
PULL STARTS AFTER DELAY
S4
+10V
L1 22µ
C28 .01
C27 .01
C26 .01
C25 .01
C20 33 16V
C19 33 16V
C18 33 16V
C30 .01
C36 1000P
C29 .01
C24 .01
C37 1000P
P58
1 2
CH3/10
CH4/10
P45
4 3 2 1
-10V
GND
+10V
AFTER DELAY

Q1, 3, 4, 11~14 : 2SC3354(T, S)
Q2 : DN1901
Q5, 6 : 2SA1161
Q7 : 2SA1309(Q, R)
Q8 : 2SC3066
Q9, 10, 15 : 2SC2671(H)

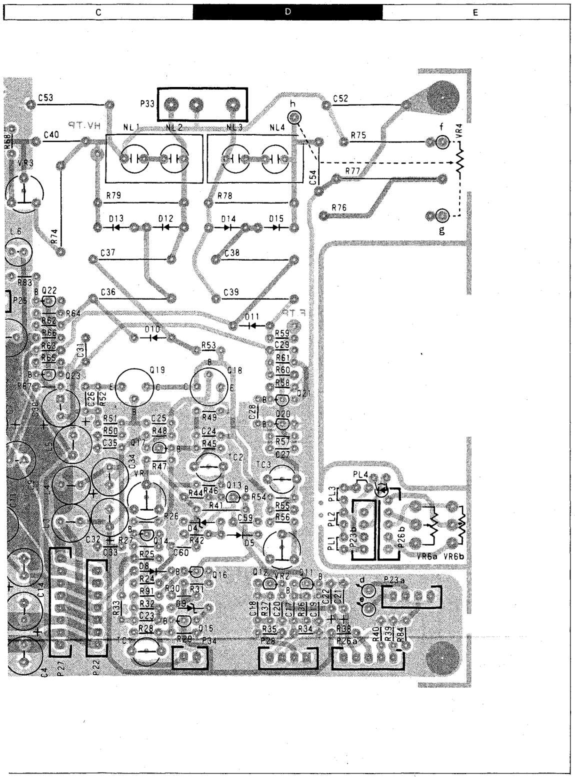
D1 : MTZ-8.2JB
D2 : SV-03Y
D3 : SV-04Y

PC BOARD

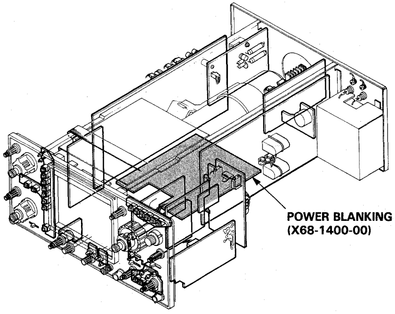
POWER BLANKING UNIT (X68-1400-00)


A
B
C
D
E
1
2
3
4
X68-1400-00
P29
P30
P32
P33
P63
P21
P22
P23a
P23b
P25
P26a
P26b
P28
P34
NL1
NL2
NL3
NL4
C53
C52
C40
R75
R77
R76
VR4
f
g
h
R79
R78
D13
D12
D14
D15
C37
C38
C36
C39
D11
D10
R53
Q19
Q18
Q21
Q20
VR1
VR2
VR3
VR6a
VR6b
VR7
TC1
TC2
TC3
IC1
IC2
IC3
L1
L2
L6
L7
L8
PL1
PL2
PL3
PL4
Q16
Q13
Q14
Q12
Q11
Q22
Q23
Q28
R74
C54
R83
R64
a
b
c
d
e

PC BOARD

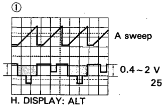


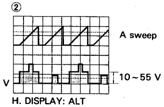
C
D
E
C53
P33
C52
h
HV.TP
NL1
NL2
NL3
NL4
R75
f
VR4
R68
C40
VR3
C54
R77
R79
R78
R76
g
D13
D12
D14
D15
L6
R74
C37
C38
C36
C39
R83
Q22
P25
R64
D11
F.TP
R62
R66
R63
R65
D10
R53
R59
C29
C31
R61
R60
Q19
Q18
R58
R67
Q23
Q21
C26
R52
C28
C30
R51
C25
R49
Q20
R50
R48
C24
R57
C35
Q17
R45
C27
C34
R47
TC2
TC3
VR1
Q13
R44
R46
R54
PL4
PL3
R41
R55
R26
D4
C59
R56
PL2
PL1
P23b
P26b
C32
R27
R42
D5
VR6a
VR6b
C33
Q14
R25
C60
D8
Q16
Q12
VR2
Q11
R24
R30
R31
d
P23a
R91
R32
e
R33
D9
C18
R37
C20
C17
R36
C19
C21
C22
C23
C14
Q15
R40
R39
R84
R28
TC1
R29
P34
R35
R34
R38
P28
P26a
C4
P21
P22

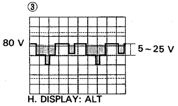


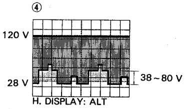
POWER BLANKING UNIT
(X68-1400-00)

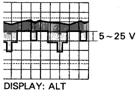
WAVEFORMS

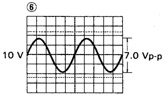


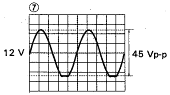








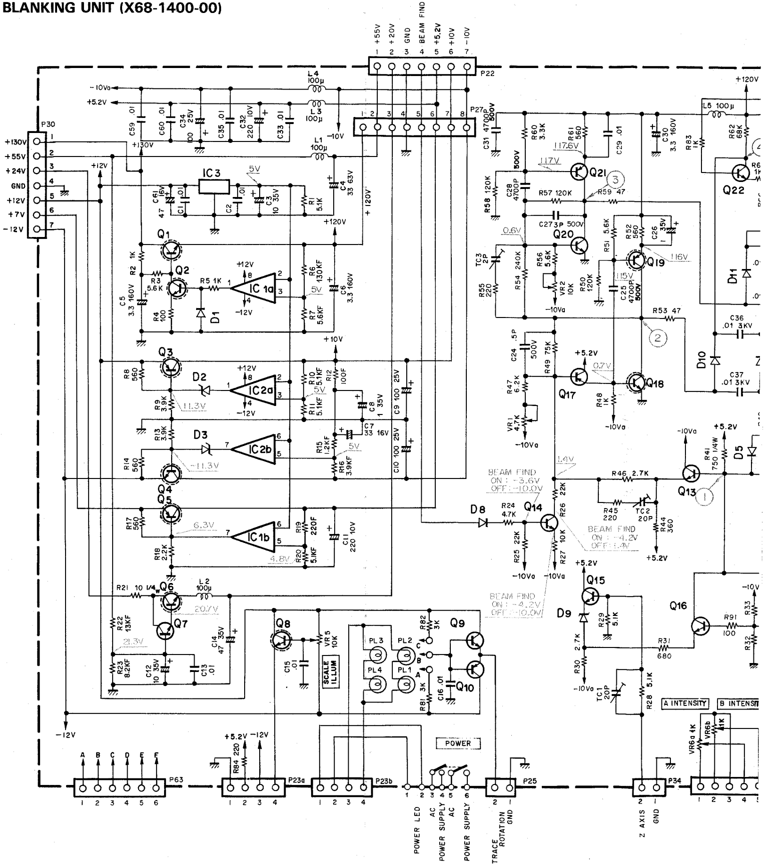


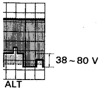


Note : ▨ : CHOP Operation

SCHEMATIC DIAGRAM

POWER BLANKING UNIT (X68-1400-00)

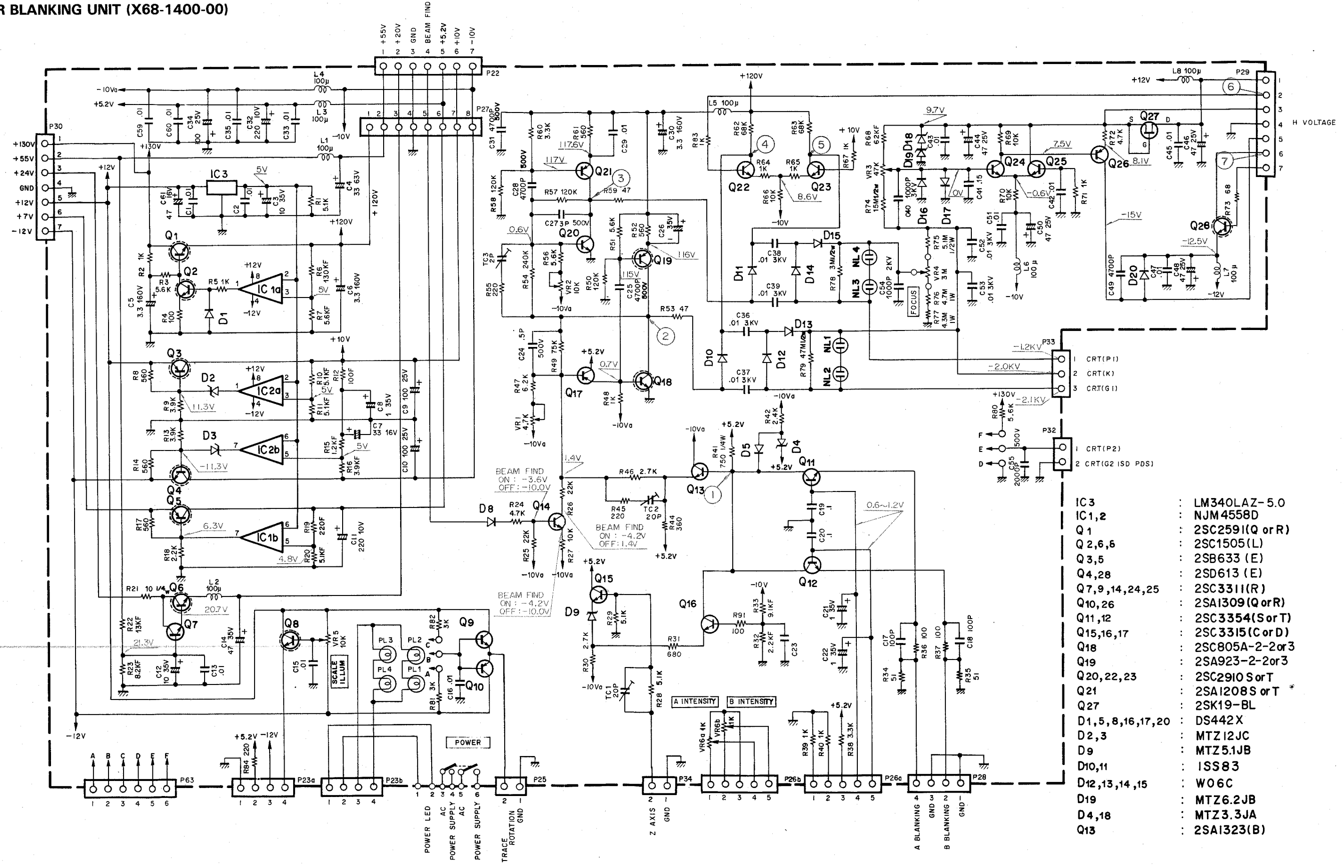

P22
1 +55V
2 +20V
3 GND
4 BEAM FIND
5 +5.2V
6 +10V
7 −10V
P27a
P30
+130V
+55V
+24V
GND
+12V
+7V
−12V
−10Va
+5.2V
L4 100μ
L3 100μ
L1 100μ
IC3
IC1a
IC2a
IC2b
IC1b
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
D1
D2
D3
D5
D8
D9
D10
D11
L2 100μ
L5 100μ
+120V
+130V
11.3V
−11.3V
6.3V
4.8V
20.7V
21.3V
117.6V
117V
116V
115V
0.6V
0.7V
1.4V
BEAM FIND ON: −3.6V OFF: −10.0V
BEAM FIND ON: −4.2V OFF: 1.4V
BEAM FIND ON: −4.2V OFF: −10.0V
SCALE ILLUM
PL1
PL2
PL3
PL4
POWER
A INTENSITY
B INTENSITY
P63
A B C D E F
P23a
P23b
P25
P34
POWER LED
AC POWER SUPPLY AC
POWER SUPPLY
TRACE ROTATION GND
Z AXIS
GND



peration

SCHEMATIC DIAGRAM

POWER BLANKING UNIT (X68-1400-00)

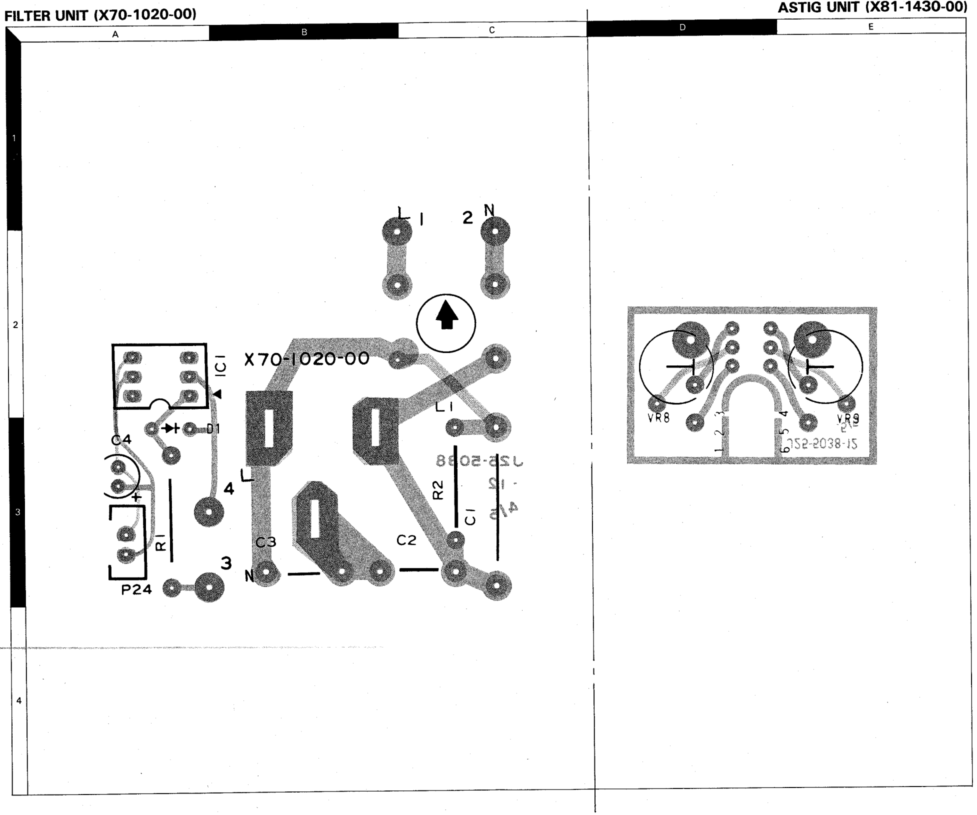

+55V
+20V
GND
BEAM FIND
+5.2V
+10V
-10V
P22
P27
P30
+130V
+55V
+24V
GND
+12V
+7V
-12V
IC3
IC1a
IC1b
IC2a
IC2b
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
L5 100μ
+120V
L8 100μ
+12V
P29
H VOLTAGE
FOCUS
NL1
NL2
NL3
NL4
P33
CRT(P1)
CRT(K)
CRT(G1)
P32
CRT(P2)
CRT(G2 ISD PDS)
-1.2KV
-2.0KV
-2.1KV
BEAM FIND
ON : -3.6V
OFF : -10.0V
BEAM FIND
ON : -4.2V
OFF : 1.4V
BEAM FIND
ON : -4.2V
OFF : -10.0V
SCALE ILLUM
PL1
PL2
PL3
PL4
POWER
A INTENSITY
B INTENSITY
VR6a 4K
VR6b 1K
P63
A B C D E F
P23a
P23b
P25
P34
P26b
P26a
P28
POWER LED
AC
POWER SUPPLY
AC
POWER SUPPLY
TRACE ROTATION
GND
Z AXIS
GND
A BLANKING
GND
B BLANKING
GND

IC3 : LM340LAZ-5.0
IC1,2 : NJM4558D
Q1 : 2SC2591(Q or R)
Q2,6,5 : 2SC1505(L)
Q3,5 : 2SB633(E)
Q4,28 : 2SD613(E)
Q7,9,14,24,25 : 2SC3311(R)
Q10,26 : 2SA1309(Q or R)
Q11,12 : 2SC3354(S or T)
Q15,16,17 : 2SC3315(C or D)
Q18 : 2SC805A-2-2or3
Q19 : 2SA923-2-2or3
Q20,22,23 : 2SC2910 S or T
Q21 : 2SA1208 S or T
Q27 : 2SK19-BL
D1,5,8,16,17,20 : DS442X
D2,3 : MTZ12JC
D9 : MTZ5.1JB
D10,11 : 1SS83
D12,13,14,15 : W06C
D19 : MTZ6.2JB
D4,18 : MTZ3.3JA
Q13 : 2SA1323(B)

PC BOARD

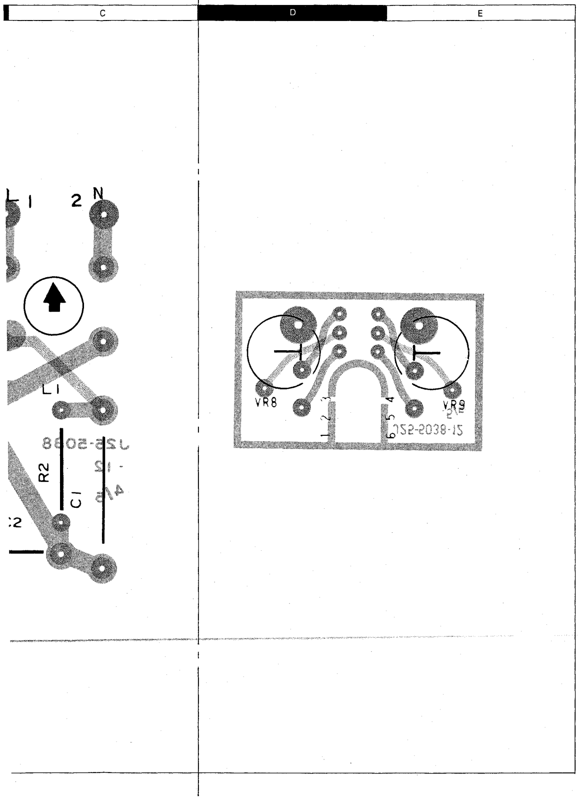
FILTER UNIT (X70-1020-00)

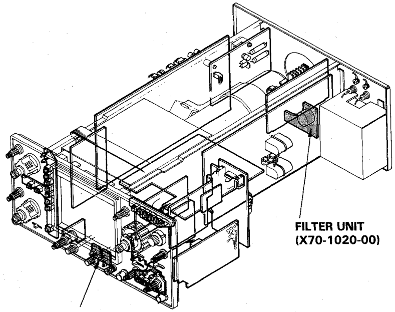
ASTIG UNIT (X81-1430-00)


A
B
C
D
E
1
2
3
4
L1
2
N
IC1
X70-1020-00
D1
C4
+
4
L
R1
3
P24
N
C3
C2
R2
C1
L1
VR8
VR9
1
2
3
4
5
6
J52-2038-15

PC BOARD

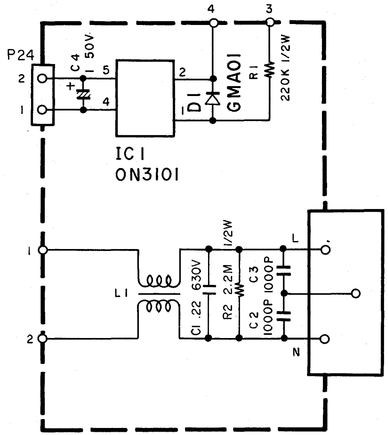
ASTIG UNIT (X81-1430-00)


C
D
E
L1
2
N
L1
R2
C1
C2
VR8
VR9
1
2
3
4
5
6
J32-2038-15


FILTER UNIT
(X70-1020-00)
ASTIG UNIT (X81-1430-00)

WAVEFORMS

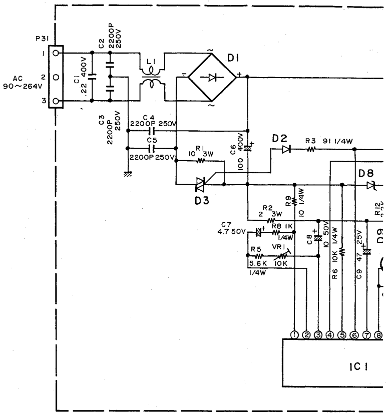
FILTER UNIT (X70-1020-00)



4
3
P24
2
1
C4
1 50V
5
4
2
1
D1
GMA01
R1
220K 1/2W
IC1
ON3101
1
2
L1
1/2W
C1 .22 630V
R2 2.2M
C2 1000P
C3 1000P
L
N

SCHEMATIC DIAGRAM

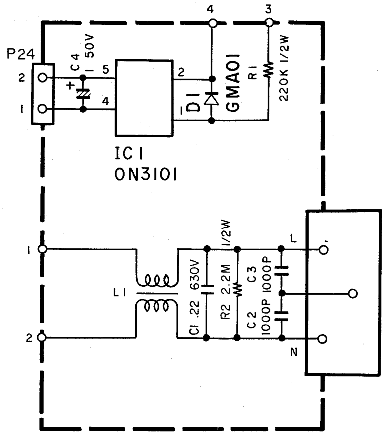
SWITCHING POWER SUPPLY UNIT (W02-0413-



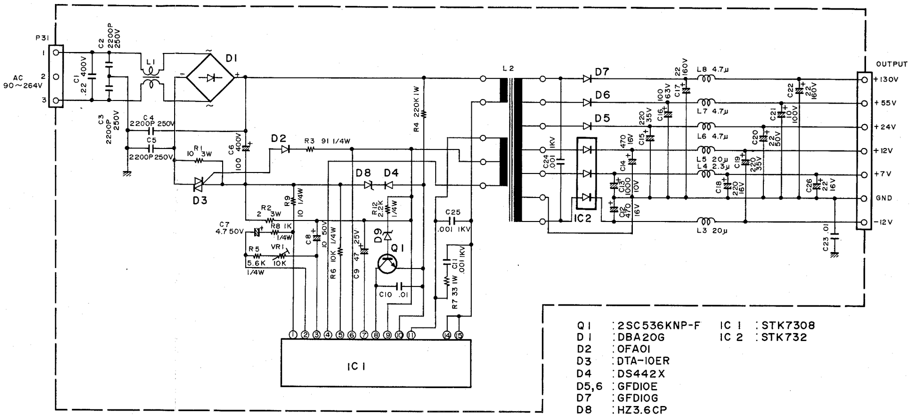
P31
1
2
3
AC 90~264V
C1 .22 400V
C2 2200P 250V
L1
D1
C3 2200P 250V
C4 2200P 250V
C5 2200P 250V
R1 10 3W
C6 100 400V
D2
R3 91 1/4W
D3
D8
R9 10 1/4W
R2 2 3W
C7 4.7 50V
R8 1K 1/4W
R5 5.6K 1/4W
VR1 10K
C8 10 50V
R6 10K 1/4W
C9 47 25V
R12
D9
①②③④⑤⑥⑦⑧
IC1

SCHEMATIC DIAGRAM

FILTER UNIT (X70-1020-00)

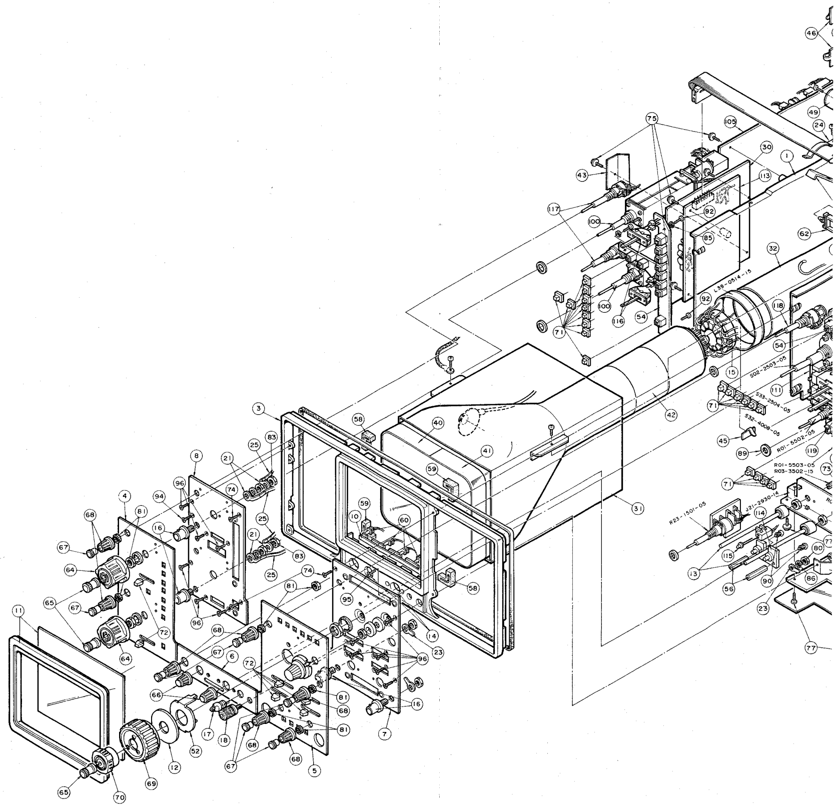

P24
C4 1 50V
IC1 ON3101
D1 GMA01
R1 220K 1/2W
L1
C1 .22 630V
R2 2.2M 1/2W
C3 1000P
C2 1000P
L
N
1
2
3
4
5

SWITCHING POWER SUPPLY UNIT (W02-0413-05)


P31
AC 90~264V
C1 .22 400V
C2 2200P 250V
C3 2200P 250V
C4 2200P 250V
C5 2200P 250V
L1
D1
R1 10 3W
C6 100 400V
D2
R3 91 1/4W
D3
D8
D4
R4 220K 1W
R2 2 3W
R9 10 1/4W
C7 4.7 50V
R8 1K 1/4W
R5 5.6K 1/4W
VR1 10K
C8 10 50V
R6 10K 1/4W
C9 47 25V
R12 2.2K 1/4W
D9
Q1
C10 .01
C25 .001 1KV
C11 .001 1KV
R7 33 1W
IC1
L2
D7
D6
D5
C24 .001 1KV
IC2
C12 470 16V
C13 1000 10V
C14 470 16V
C15 220 35V
C16 100 63V
C17 22 160V
L8 4.7µ
L7 4.7µ
L6 4.7µ
L5 20µ
L4 2.3µ
L3 20µ
C18 220 16V
C19 220 35V
C20 22 50V
C21 10 100V
C22 22 160V
C26 22 16V
C23 .01
OUTPUT
+130V
+55V
+24V
+12V
+7V
GND
-12V

Q1 :2SC536KNP-F
D1 :DBA20G
D2 :OFA01
D3 :DTA-10ER
D4 :DS442X
D5,6 :GFD10E
D7 :GFD10G
D8 :HZ3.6CP
D9 :GZA6.2Z
IC 1 :STK7308
IC 2 :STK732

DISASSEMBLY


L39-0514-15
S02-2503-05
S33-2504-05
S32-4008-05
R01-5502-05
R01-5503-05
R03-3502-15
J21-2930-14
R23-1501-05
1
3
4
5
6
7
8
10
11
12
13
14
15
16
17
18
21
23
24
25
30
31
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67
68
69
70
71
72
73
74
75
77
80
81
83
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100
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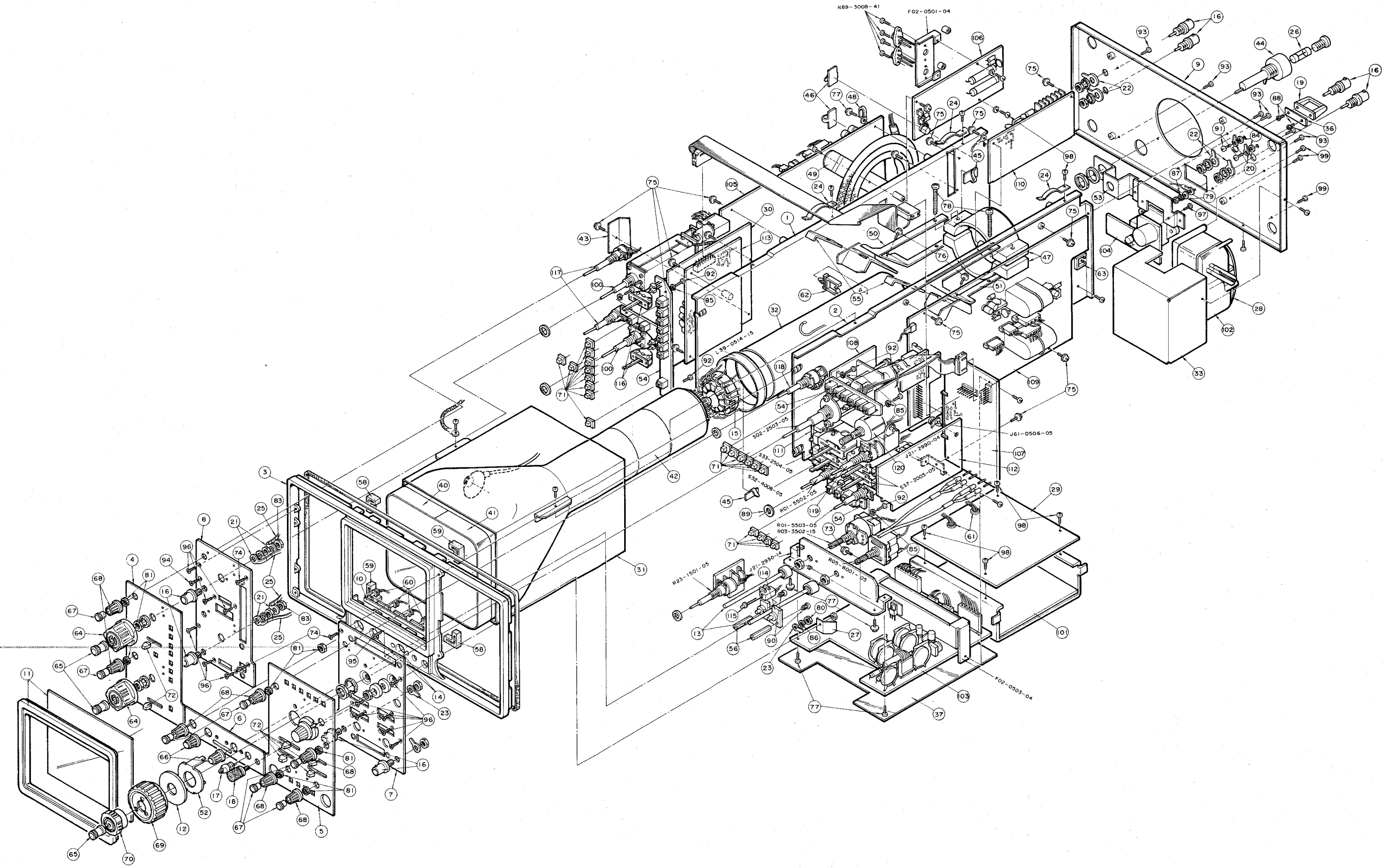
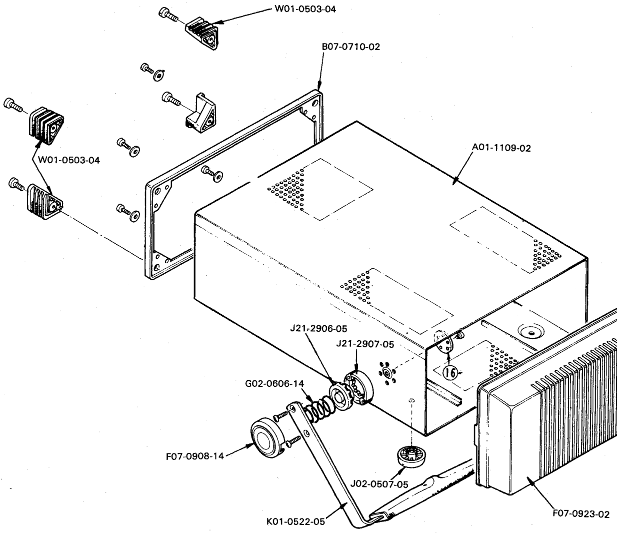
119

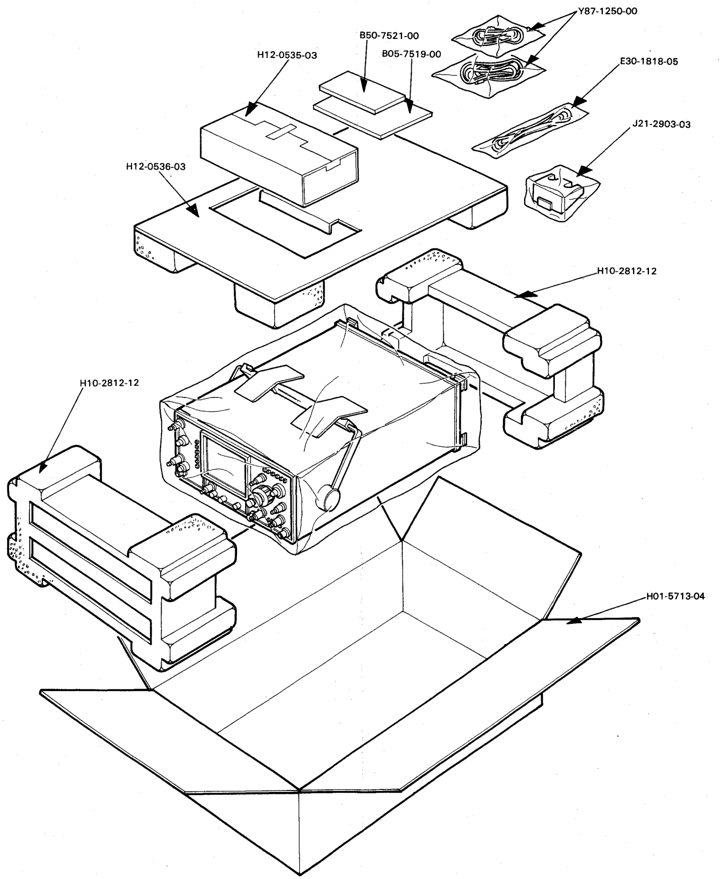
DISASSEMBLY


N89-3008-41
F02-0501-04
L39-0514-15
S02-2503-05
S33-2504-05
S32-4008-05
R01-5502-05
R01-5503-05
R03-3502-15
J61-0506-05
J21-2990-04
S37-2005-05
J21-2930-14
R23-1501-05
R05-8001-05
F02-0503-04

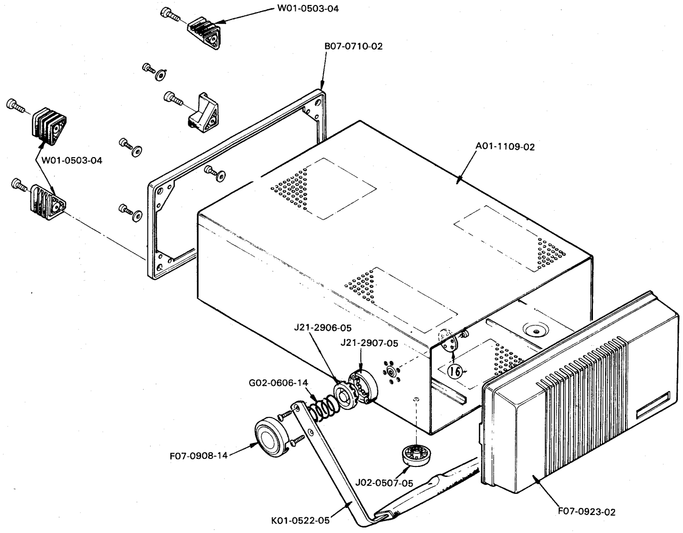
DISASSEMBLY

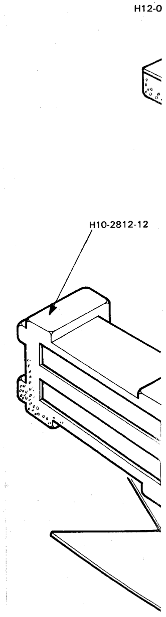

W01-0503-04
B07-0710-02
W01-0503-04
A01-1109-02
J21-2906-05
J21-2907-05
16
G02-0606-14
F07-0908-14
J02-0507-05
K01-0522-05
F07-0923-02

PACKING


Y87-1250-00
B50-7521-00
H12-0535-03
B05-7519-00
E30-1818-05
J21-2903-03
H12-0536-03
H10-2812-12
H10-2812-12
H01-5713-04

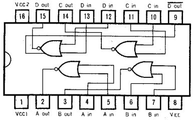
DISASSEMBLY


W01-0503-04
B07-0710-02
W01-0503-04
A01-1109-02
J21-2906-05
J21-2907-05
16
G02-0606-14
F07-0908-14
J02-0507-05
K01-0522-05
F07-0923-02

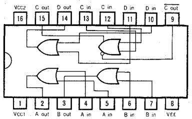

H12-0
H10-2812-12

SEMICONDUCTORS

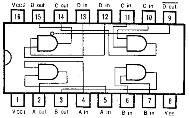
C-MOS IC


VCC2
D out
C out
D in
D in
C in
C in
$\overline{\text{D out}}$
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

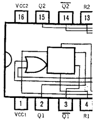
MC10102L


VCC2
C out
D out
C in
C in
D in
D in
$\overline{\text{C out}}$
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

MC10103L
MC10H103L

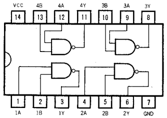

VCC2
D out
C out
D in
D in
C in
C in
$\overline{\text{D out}}$
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

MC10104L

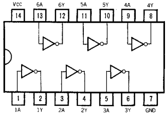

VCC2
Q2
$\overline{\text{Q2}}$
R2
16
15
14
13
1
2
3
4
VCC1
Q1
$\overline{\text{Q1}}$
R1

MC
MC

TTL IC

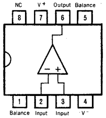

VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

SN7400N

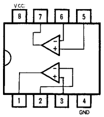

VCC
6A
6Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

SN7406N

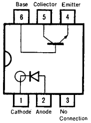
OTHER


NC
V+
Output
Balance
8
7
6
5
1
2
3
4
Balance
Input
Input
V−

LF441ACN

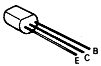

VCC
8
7
6
5
1
2
3
4
GND

LF412CN
NJM4558D

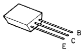

Base
Collector
Emitter
6
5
4
1
2
3
Cathode
Anode
No Connection

ON3101

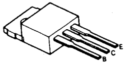
TRANSISTOR



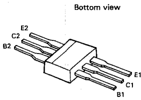
2SC1973(T)
2SC2910(S or T)
2SA1208(S or T)
2SD438(F)



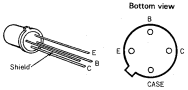
2SC3354(T, S)
2SC3315(C, D)
2SC3311(Q, R)
2SA1309(Q, R)
2SA1323(B)



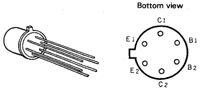
2SC2591(Q, R)
2SB633(E)
2SD613(E)
2SC1505(L)


Bottom view
E2
C2
B2
E1
C1
B1

2SC3066
2SA1239

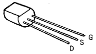

Shield
E
B
C
Bottom view
B
E
C
CASE

2SC1164

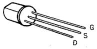

Bottom view
C1
E1
B1
E2
B2
C2

2SC1733

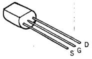
FET



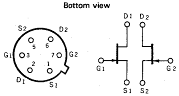
J304



2SK19(BL)



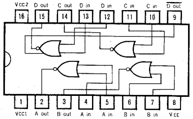
2SK30A(O)
2SK127(Q)
2SJ43(Q)


Bottom view
S2
D2
5
6
G1
3
7
G2
2
1
D1
S1
D1
D2
G1
G2
S1
S2

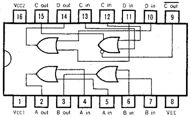
DN1901

SEMICONDUCTORS

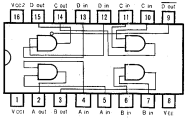
C-MOS IC


VCC2
D out
C out
D in
D in
C in
C in
D out
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

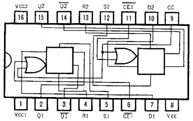
MC10102L


VCC2
C out
D out
C in
C in
D in
D in
C out
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

MC10103L
MC10H103L

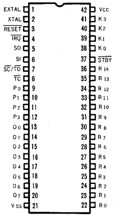

VCC2
D out
C out
D in
D in
C in
C in
D out
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
A out
B out
A in
A in
B in
B in
VEE

MC10104L

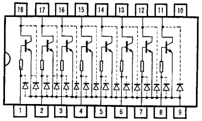

VCC2
Q2
Q2
R2
S2
CE2
D2
CC
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
VCC1
Q1
Q1
R1
S1
CE1
D1
VEE

MC10131L
MC10H131L

CPU

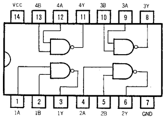

EXTAL 1
XTAL 2
RESET 3
IRQ 4
SO 5
SI 6
SC/TO 7
TC 8
P0 9
P1 10
P2 11
P3 12
O0 13
O1 14
O2 15
O3 16
O4 17
O5 18
O6 19
O7 20
VSS 21
42 VCC
41 K3
40 K2
39 K1
38 K0
37 STBY
36 R14
35 R13
34 R12
33 R11
32 R10
31 R9
30 R8
29 R7
28 R6
27 R5
26 R4
25 R3
24 R2
23 R1
22 R0

MTM-5010

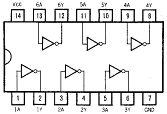

18
17
16
15
14
13
12
11
10
1
2
3
4
5
6
7
8
9

AN90B20

TTL IC

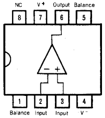

VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

SN7400N

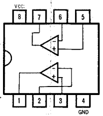

VCC
6A
6Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

SN7406N

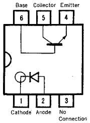
OTHER


NC
V+
Output
Balance
8
7
6
5
1
2
3
4
Balance
Input
Input
V−

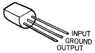
LF441ACN


VCC
8
7
6
5
1
2
3
4
GND

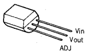
LF412CN
NJM4558D


Base
Collector
Emitter
6
5
4
1
2
3
Cathode
Anode
No Connection

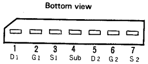
ON3101


INPUT
GROUND
OUTPUT

LM340LAZ-5.0
MC78L05CP
MC78L15ACP

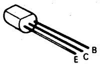

Vin
Vout
ADJ

LM337LZ
LM317LZ

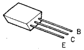

Bottom view
1
2
3
4
5
6
7
D1
G1
S1
Sub
D2
G2
S2

M47F(C)

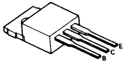
TRANSISTOR



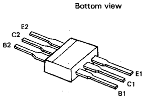
2SC1973(T)
2SC2910(S or T)
2SA1208(S or T)
2SD438(F)



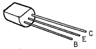
2SC3354(T, S)
2SC3315(C, D)
2SC3311(Q, R)
2SA1309(Q, R)
2SA1323(B)



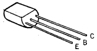
2SC2591(Q, R)
2SB633(E)
2SD613(E)
2SC1505(L)


Bottom view
E2
C2
B2
E1
C1
B1

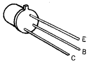
2SC3066
2SA1239



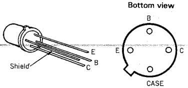
2SC2671(H)
2SA1161
2SC2644



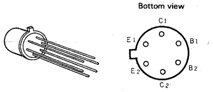
2SA1206



2SA923-2-2 or 3
2SC805A2-2 or 3

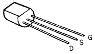

Bottom view
E
B
C
Shield
B
E
C
CASE

2SC1164

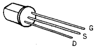

Bottom view
C1
E1
B1
E2
B2
C2

2SC1733

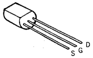
FET



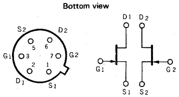
J304



2SK19(BL)



2SK30A(O)
2SK127(Q)
2SJ43(Q)


Bottom view
S2
D2
5
6
G1
3
7
G2
2
1
D1
S1
D1
D2
G1
G2
S1
S2

DN1901

CS-2110

100MHz QUAD-TRACE OSCILLOSCOPE

COMPOSITE

(Revised Edition)

Serial No. 5040001 ~

KENWOOD

NOTE:

This composite (revised edition) consists of parts list, printed circuit board diagram and circuit diagram.
For the circuit description, adjustment, troubleshooting and waveform diagram, refer to CS-2110 Service Manual.

PARTS LIST

MAIN CHASSIS

Y70-1490-21

REF.NO	PARTS NO	NAME & DESCRIPTION
—	A01-1109-22	CASE
1	A13-0763-22	FRAME(L)
2	A13-0764-22	FRAME(R)
3	A20-2767-05	DIE-CAST PANEL
4	A21-1045-14	DECORATIVE PANEL
5	A21-1046-04	DECORATIVE PANEL
6	A21-1047-14	DECORATIVE PANEL
7	A22-0817-33	SUB PANEL
8	A22-0833-03	SUB PANEL
9	A23-1645-22	REAR PANEL
10	A33-0501-14	REFLECTOR
—	B07-0710-02	REAR ESCUTCHEON
11	B19-0735-03	FILTER
12	B20-0927-04	SCALE
—	B40-2765-04	NAME PLATE (SERIAL NO)
—	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)
—	B50-7541-10	INSTRUCTION MANUAL
—	B50-7543-10	INSTRUCTION MANUAL
13	D21-0906-04	EXTENSION SHAFT
14	D23-0801-04	SPACER
15	E01-1404-05	CRT SOCKET
16	E04-0251-05	BNC RECEPTACLE
17	E21-0654-04	TERMINAL (CAL)
18	E21-0657-04	TERMINAL (GND)
19	E21-0659-15	TERMINAL (CURRENT)
20	E23-0015-04	EARTH LUG
21	E23-0018-04	EARTH LUG
22	E23-0513-05	EARTH LUG
23	E23-0520-05	EARTH LUG
25	E23-0529-04	EARTH LUG
—	E30-1818-05	POWER CORD (JIS)
—	E31-2473-05	LEAD WIRE WITH CONNECTOR
—	E31-2474-05	LEAD WIRE WITH CONNECTOR
—	E31-2546-05	LEAD WIRE WITH CONNECTOR
—	E33-4047-00	WIRE ASSY
26	F05-1224-05	FUSE 1.2A
—	F07-0908-14	PROTECTION COVER
—	F07-0923-02	PROTECTION COVER
27	F10-1553-14	SHIELD PLATE (FOR CH3)
28	F10-1567-14	SHIELD PLATE
29	F10-1568-04	SHIELD PLATE (FOR SW)
30	F10-1569-14	SHIELD PLATE
—	F10-1583-04	SHIELD PLATE
31	F11-0983-12	SHIELD CASE(FOR CRT)
32	F11-0984-04	SHIELD CASE (FOR CRT)
33	F11-0985-04	SHIELD CASE
—	F15-0138-04	BLIND PLATE
—	F15-0716-24	BLIND PLATE
36	F20-0621-04	INSULATOR
37	F20-0624-04	INSULATOR (FOR BLANKING)
—	F20-0627-04	INSULATOR (FOR BATTERY)
—	F20-0639-04	INSULATOR
—	F20-0654-04	INSULATOR
—	G02-0606-14	SPRING FOR HANDLE
40	G16-0602-04	REFLECTOR SHEET(L)
41	G16-0603-04	REFLECTOR SHEET(R)
42	G16-0609-04	RUBBER SHEET
—	H01-5734-04	CARTON BOX
—	H01-5734-04	CARTON BOX
—	H10-2812-12	FOAMED STYRENE PAD
—	H12-0535-03	PAD
—	H12-0536-03	PAD
—	H20-1719-04	VINYL COVER
—	J02-0507-05	LEG
44	J13-0033-15	FUSE HOLDER
45	J19-1620-05	CORD CLAMP
46	J19-1622-05	CORD CLAMP
47	J19-1639-14	CRT BAND
48	J21-0392-04	HOLDER FOR LEAD
49	J21-2871-14	HOLDER FOR D.LINE
—	J21-2903-03	HOLDER FOR PROBE
—	J21-2906-05	GEAR FOR HANDLE
—	J21-2907-05	RING FOR HANDLE
50	J21-2925-13	BLACKET FOR CRT
51	J21-2926-13	BLACKET FOR CRT
52	J21-2927-14	BLACKET FOR CRT
53	J21-2989-04	BLACKET
54	J25-5031-02	PCB (UNMOUNTED)
55	J29-0505-04	GUIDE
56	J32-0838-04	BOSS
57	J39-0506-04	SPACER FOR V.R
58	J42-0512-14	CRT MOUNTING RUBBER
59	J42-0513-14	CRT MOUNTING RUBBER
60	J42-0514-04	BUSHING
61	J42-0515-05	BUSHING
—	J61-0049-05	WIRE BAND
—	J61-0408-05	WIRE WRAPPING BAND
62	J61-0511-05	SADDLE FOR WIRE
63	J61-0520-05	SADDLE
—	K01-0522-05	HANDLE
64	K21-0868-03	KNOB
65	K21-0869-04	KNOB
66	K21-0870-04	KNOB
67	K21-0871-04	KNOB
68	K21-0872-04	KNOB
69	K21-0873-04	KNOB
70	K21-0874-03	KNOB
71	K27-0524-14	KNOB FOR PUSH SW
72	K27-0530-04	KNOB FOR LEVER
—	N08-0611-04	DRESSED SCREW
73	N09-0402-05	SCREW
—	N09-0705-05	SCREW, HEX SOCKET FLAT HD
74	N09-0707-05	SCREW
75	N09-0709-05	SCREW
76	N09-0710-05	SCREW, SEMS PAN HD
77	N09-0711-05	SCREW
78	N09-0721-04	SCREW
79	N10-2030-41	NUT
80	N10-2060-46	NUT
81	N14-0602-34	NUT
82	N14-0609-04	NUT
83	N14-0617-05	NUT
—	N15-1030-41	WASHER, FLAT FOR M3
84	N16-0026-46	SPRING WASHER
85	N16-0030-46	SPRING WASHER
86	N16-0060-46	SPRING WASHER
87	N17-1030-41	LOCK WASHER
88	N19-0191-05	WASHER NONMETAL
89	N19-0704-04	WASHER
—	N19-0710-05	WASHER
90	N30-2606-46	SCREW, PAN HD M 2.6X6
91	N30-2608-41	SCREW, PAN HD M 2.6X8
—	N30-3004-41	SCREW, PAN HD M 3X4
92	N30-3006-46	SCREW, PAN HD M 3X6
93	N30-3008-41	SCREW, PAN HD M 3X8
94	N32-2006-46	SCREW, FLAT HD M 2X6
95	N32-2606-46	SCREW, FLAT HD M 2.6X6
96	N32-3006-46	SCREW, FLAT HD M 3X6

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
97	N32-3008-41	SCREW, FLAT HD M 3X8
98	N89-3006-46	SCREW, BINDING TAP TITE
99	N89-3010-41	SCREW, BINDING TAP TITE
	R92-0150-05	JUMPING RES. ZERO OHM
100	S02-4502-05	ROTARY SWITCH
—	W01-0503-04	CORD WRAP
101	W02-0413-05	SWITCHING POWER SUPPLY
102	W02-0414-05	HIGH VOLTAGE BLOCK
—	W09-0405-05	LITHIUM BATTERY 3V 0.2AH
103	X68-1400-00	POWER BLANKING UNIT
104	X70-1020-00	FILTER UNIT
105	X73-1500-03	AMPLIFIER UNIT
106	X73-1510-03	AMPLIFIER UNIT
107	X73-1520-00	CH3,CH4 AMP UNIT
108	X74-1310-00	SWEEP ROTARY UNIT
109	X74-1350-00	TRIG SWEEP UNIT
110	X74-1360-00	HORIZONTAL OUTPUT UNIT
111	X77-1280-00	A TRIG SWITCH UNIT
112	X77-1290-00	B TRIG UNIT
113	X81-1320-00	CPU UNIT
114	X81-1430-00	ASTIG UNIT
—	Y87-1250-00	PROBE(PC-29)
	001-0801-05	COATING WIRE
	002-0001-05	BRAIDED WIRE
	002-0006-05	BRAIDED WIRE
	150KTM31	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
	420-0010-05	ADHESIVES
	490-0007-05	TAPE
	490-0010-05	TAPE
	490-0012-05	TAPE
	490-0040-05	TAPE
	490-0127-05	TAPE
C001	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
C002	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
D001	LN222RP	DIODE
D002	LN322GP	DIODE
D003	LN222RP	DIODE
D004	LN322GP	DIODE
D005	LN322GP	DIODE
D006	LN322GP	DIODE
D007	LN222RP	DIODE
115 D008	B30-0903-15	LED LAMP (RED)
J002	E31-2445-15	LEAD WIRE WITH CONNECTOR
J003	E31-2441-05	LEAD WIRE WITH CONNECTOR
J004	E31-2441-05	LEAD WIRE WITH CONNECTOR
J005	E31-2444-05	LEAD WIRE WITH CONNECTOR
J006	E31-2444-05	LEAD WIRE WITH CONNECTOR
J007	E31-2443-15	LEAD WIRE WITH CONNECTOR
J008	E31-2443-15	LEAD WIRE WITH CONNECTOR
J030	E31-2464-05	LEAD WIRE WITH CONNECTOR
J031	E31-2468-05	LEAD WIRE WITH CONNECTOR
J032	E31-2465-15	LEAD WIRE WITH CONNECTOR
J033	E31-2466-05	LEAD WIRE WITH CONNECTOR
J044	E31-2452-15	LEAD WIRE WITH CONNECTOR
J045	E31-2471-05	LEAD WIRE WITH CONNECTOR
J046	E31-2449-15	LEAD WIRE WITH CONNECTOR
J049	E31-2446-15	LEAD WIRE WITH CONNECTOR
J050	NO USE	
J051	E31-2451-15	LEAD WIRE WITH CONNECTOR
J052	NO USE	
J053	E31-2460-15	LEAD WIRE WITH CONNECTOR
J054	NO USE	
J055	E31-2472-05	LEAD WIRE WITH CONNECTOR
J056	E31-2475-25	LEAD WIRE WITH CONNECTOR
J059	E31-2448-05	LEAD WIRE WITH CONNECTOR
J060	E31-2475-25	LEAD WIRE WITH CONNECTOR
J061	E31-2470-05	LEAD WIRE WITH CONNECTOR
J062	E31-2469-05	LEAD WIRE WITH CONNECTOR
L001	L39-0514-15	Y ALIGNMENT COIL
L002	L76-0108-25	DELAY LINE
R001	RD14BB2E105J	RES. CARBON 1M 5% 1/4W
R002	RD14BB2E105J	RES. CARBON 1M 5% 1/4W
R003	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R004	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R005	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R006	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R007	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R008	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R012	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R013	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R014	RD14BB2E473J	RES. CARBON 47K 5% 1/4W
S001	S40-1504-05	PUSH SWITCH
S002	S40-1504-05	PUSH SWITCH
S003	S40-1504-05	PUSH SWITCH
S004	S40-1504-05	PUSH SWITCH
S005	S40-1504-05	PUSH SWITCH
S006	S40-1504-05	PUSH SWITCH
S007	S40-1504-05	PUSH SWITCH
S008	S40-1504-05	PUSH SWITCH
S009	S40-1504-05	PUSH SWITCH
S010	S40-1504-05	PUSH SWITCH
S011	S40-1504-05	PUSH SWITCH
S012	S40-1504-05	PUSH SWITCH
S013	S40-1504-05	PUSH SWITCH
S014	S40-1504-05	PUSH SWITCH
S015	S40-1504-05	PUSH SWITCH
S016	S40-1504-05	PUSH SWITCH
S017	S40-1504-05	PUSH SWITCH
S018	S40-1504-05	PUSH SWITCH
S019	S40-1504-05	PUSH SWITCH
S020	S40-1505-05	PUSH SWITCH
116 S023	S33-1501-05	LEVER SWITCH
— S024	S33-1501-05	LEVER SWITCH
117 VR001	R23-1502-05	V.R. 1K B
VR002	R23-1502-05	V.R. 1K B
118 VR005	R23-2501-05	V.R. 5K B X2
119 VR006	R06-2502-05	V.R. WITH PUSH,SW
120 VR007	R29-0504-05	V.R. 1K B

VERTICAL PREAMP UNIT

X73-1500-00

REF.NO	PARTS NO	NAME & DESCRIPTION
	E23-0015-04	EARTH LUG
	E29-0504-05	TEFLON TERMINAL
	J25-5038-22	PCB (UNMOUNTED)
	L92-0110-05	BEAD CORE
	001-0801-05	COATING WIRE
	002-0001-05	BRAIDED WIRE
	212-3017-05	TUBE (PLASTIC)
C001	C91-0502-05	CAP. METAL FILM 0.01 20% 630V
C002	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C003	CC45CH1H151J	CAP. CERAMIC 150P 5% 50V
C004	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C005	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C006	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C007	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C008	C90-0298-05	CAP. CERAMIC 0.1 20% 12V
C009	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C010	CM93BD2A680J	CAP. MICA 68P 5% 100V
C013	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C014	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C021	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C027	CC45CH1H390J	CAP. CERAMIC 39P 5% 50V
C028	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C034	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V
C035	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V
C036	C91-0502-05	CAP. METAL FILM 0.01 20% 630V
C037	NO USE	
C038	CC45CH1H151J	CAP. CERAMIC 150P 5% 50V
C039	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C040	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C041	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C042	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C043	C90-0298-05	CAP. CERAMIC 0.1 20% 12V
C044	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C045	CM93BD2A680J	CAP. MICA 68P 5% 100V
C046	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C047	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C048	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C049	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C050	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C051	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C052	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C053	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C054	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C055	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C056	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C057	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C058	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C059	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C060	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C061	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C062	CC45CH1H330J	CAP. CERAMIC 33P 5% 50V
C063	NO USE	
C064	CC45CH1H120J	CAP. CERAMIC 12P 5% 50V
C065	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C066	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C067	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C068	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
C071	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C072	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C075	CC45SL1H181J	CAP. CERAMIC 180P 5% 50V
C076	CC45SL1H181J	CAP. CERAMIC 180P 5% 50V
C077	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C080	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C081	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C082	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C083	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C084	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C085	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C086	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C087	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C088	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C089	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C090	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C091	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C092	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C093	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C094	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C095	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C096	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C097	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C098	CE04W1C101M	CAP. ELECTRO 100 20% 16V
C099	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C100	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C101	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C102	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C103	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C104	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C105	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C106	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C107	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C108	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C109	CE04W1C100M	CAP. ELECTRO 10 20% 16V
C110	CE04W1C101M	CAP. ELECTRO 100 20% 16V
C111	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C112	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C113	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C114	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C115	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C116	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C117	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C118	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C119	NO USE	
C120	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C121	CC45SL1H221J	CAP. CERAMIC 220P 5% 50V
C122	CC45SL1H221J	CAP. CERAMIC 220P 5% 50V
C123	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C124	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C125	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C126	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C127	NO USE	
C128	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C132	CC45SL1H101J	CAP. CERAMIC 100P 5% 50V
C136	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V
C137	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V
C138	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C139	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C140	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C141	CC45CH1H100D	CAP. CERAMIC 10P 0.5P 50V
C142	CC45CH1H100D	CAP. CERAMIC 10P 0.5P 50V
C145	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C146	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C147	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C148	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V
D001	1S1544A	DIODE
D002	1S1544A	DIODE
D003	MTZ3.3JA	DIODE, ZENER 3.2V
D004	1SS132	DIODE
D005	1SS132	DIODE
D006	1SS132	DIODE
D007	1SS132	DIODE
D008	1SS132	DIODE
D009	1SS132	DIODE
D010	1SS132	DIODE
D011	MTZ3.3JA	DIODE, ZENER 3.2V
D012	MTZ3.3JA	DIODE, ZENER 3.2V
D013	1S1544A	DIODE
D014	1S1544A	DIODE
D015	MTZ3.3JA	DIODE, ZENER 3.2V
D016	1SS132	DIODE
D017	1SS132	DIODE
D018	MTZ7.5JA	DIODE, ZENER 7.1V
D019	1N60	DIODE
D020	1SS132	DIODE
D021	1SS132	DIODE
D022	1SS132	DIODE
D023	1SS132	DIODE
D024	1SS132	DIODE
D025	MTZ3.3JA	DIODE, ZENER 3.2V
D026	MTZ7.5JA	DIODE, ZENER 7.1V
D027	1SS132	DIODE
D028	MTZ7.5JA	DIODE, ZENER 7.1V
D029	1SS132	DIODE
D030	1SS132	DIODE
D031	1SS132	DIODE
D032	1SS132	DIODE
D033	1SS132	DIODE
D034	1SS132	DIODE
D035	1SS132	DIODE
D036	1SS132	DIODE
D037	1SS132	DIODE
D038	1SS132	DIODE
D039	1SS132	DIODE
D040	1SS132	DIODE
D041	1SS132	DIODE
D042	1SS132	DIODE
D043	1SS132	DIODE
D044	1SS132	DIODE
D045	1SS132	DIODE
D046	1SS132	DIODE
IC001	LF441ACN	IC, LOW-POWER JFET OP-AMP
IC002	LF441ACN	IC, LOW-POWER JFET OP-AMP
IC003	SN7400N	IC, QUAD 2-INPUT NAND
IC004	MC10104L	IC, QUAD 2-INPUT AND GATE
IC005	MC10131L	IC, DUAL D-FFS
IC006	MC10102L	IC, QUAD 2-INPUT NOR GATE
IC007	MC10102L	IC, QUAD 2-INPUT NOR GATE
IC008	LM337LZ	IC, REGULATOR
IC009	LM317LZ	IC, REGULATOR
L001	L40-4791-02	FERRI INDUCTOR 4.7UH
L002	L40-4791-02	FERRI INDUCTOR 4.7UH
L003	L40-4791-02	FERRI INDUCTOR 4.7UH
L004	L40-4791-02	FERRI INDUCTOR 4.7UH
L005	L40-4791-02	FERRI INDUCTOR 4.7UH
L006	L40-4791-02	FERRI INDUCTOR 4.7UH
L007	L40-4791-02	FERRI INDUCTOR 4.7UH
L008	L40-4791-02	FERRI INDUCTOR 4.7UH
L009	L40-4791-02	FERRI INDUCTOR 4.7UH
L010	L40-4791-02	FERRI INDUCTOR 4.7UH
L011	L40-1011-04	FERRI INDUCTOR 100UH
L012	L40-4791-02	FERRI INDUCTOR 4.7UH
L013	L40-4791-02	FERRI INDUCTOR 4.7UH
L014	L40-4791-02	FERRI INDUCTOR 4.7UH
L015	L40-4791-02	FERRI INDUCTOR 4.7UH
L016	L40-4791-02	FERRI INDUCTOR 4.7UH
L017	L40-4791-02	FERRI INDUCTOR 4.7UH
L018	L40-4791-02	FERRI INDUCTOR 4.7UH
L019	NO USE	
L020	L40-4791-02	FERRI INDUCTOR 4.7UH
L021	L40-4791-02	FERRI INDUCTOR 4.7UH
L022	L40-4791-02	FERRI INDUCTOR 4.7UH
L023	L40-4791-02	FERRI INDUCTOR 4.7UH
P001	E40-0473-05	PIN CONNECTOR 4 P
P002	E40-1273-05	PIN CONNECTOR 12 P
P003	E40-0473-05	PIN CONNECTOR 4 P
P004	E40-0473-05	PIN CONNECTOR 4 P
P005	E40-0373-05	PIN CONNECTOR 3 P
P006	E40-0373-05	PIN CONNECTOR 3 P
P007	E40-0573-05	PIN CONNECTOR 5 P
P008	E40-0573-05	PIN CONNECTOR 5 P
P009	E40-0315-05	PIN CONNECTOR 3 P
P010	NO USE	
P011	E40-0473-05	PIN CONNECTOR 4 P
P012	E40-0473-05	PIN CONNECTOR 4 P
P013	NO USE	
P014	E40-0773-05	PIN CONNECTOR 7 P
P015	E40-0273-05	PIN CONNECTOR 2 P
P016	E40-0273-05	PIN CONNECTOR 2 P
P019	E40-0273-05	PIN CONNECTOR 2 P
P020	E40-0573-05	PIN CONNECTOR 5 P
P021	E40-0273-05	PIN CONNECTOR 2 P
Q001	J304	FET. N-CHANNEL
Q002	2SC2671(H)	TR. SI, NPN
Q003	2SC2671(H)	TR. SI, NPN
Q004	2SC2671(H)	TR. SI, NPN
Q005	2SC2671(H)	TR. SI, NPN
Q006	2SC3354(T,S)	TR. SI, NPN
Q007	2SC3354(T,S)	TR. SI, NPN
Q008	2SC1733	TR. SI, NPN
Q009	2SC3354(T,S)	TR. SI, NPN
Q010	2SC3354(T,S)	TR. SI, NPN
Q011	2SC3354(T,S)	TR. SI, NPN
Q012	2SC3354(T,S)	TR. SI, NPN
Q013	2SC3315(C,D)	TR. SI, NPN
Q014	2SC3311(R)	TR. SI, NPN
Q015	2SA1161	TR. SI, PNP
Q016	2SA1161	TR. SI, PNP

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q017	2SC3311(R)	TR. SI, NPN			
Q018	2SA1323(B)	TR. SI, PNP			
Q019	2SA1323(B)	TR. SI, PNP			
Q020	2SC3354(T,S)	TR. SI, NPN			
Q021	2SC3354(T,S)	TR. SI, NPN			
Q022	2SC2671(H)	TR. SI, NPN			
Q023	2SC2671(H)	TR. SI, NPN			
Q024	2SC2671(H)	TR. SI, NPN			
Q025	2SC2671(H)	TR. SI, NPN			
Q026	2SC3315(C,D)	TR. SI, NPN			
Q027	2SC3315(C,D)	TR. SI, NPN			
Q028	2SC3354(T,S)	TR. SI, NPN			
Q029	2SC3354(T,S)	TR. SI, NPN			
Q030	J304	FET. N-CHANNEL			
Q031	2SC2671(H)	TR. SI, NPN			
Q032	2SC2671(H)	TR. SI, NPN			
Q033	2SC2671(H)	TR. SI, NPN			
Q034	2SC2671(H)	TR. SI, NPN			
Q035	2SC3354(T,S)	TR. SI, NPN			
Q036	2SC3354(T,S)	TR. SI, NPN			
Q037	2SC1733	TR. SI, NPN			
Q038	2SC3354(T,S)	TR. SI, NPN			
Q039	2SC3354(T,S)	TR. SI, NPN			
Q040	2SC3354(T,S)	TR. SI, NPN			
Q041	2SC3354(T,S)	TR. SI, NPN			
Q042	2SC3315(C,D)	TR. SI, NPN			
Q043	2SC3311(R)	TR. SI, NPN			
Q044	2SA1161	TR. SI, PNP			
Q045	2SA1161	TR. SI, PNP			
Q046	2SA1161	TR. SI, PNP			
Q047	2SA1161	TR. SI, PNP			
Q048	2SC3311(R)	TR. SI, NPN			
Q049	2SA1309(Q,R)	TR. SI, PNP			
Q050	2SA1309(Q,R)	TR. SI, PNP			
Q051	2SC3311(R)	TR. SI, NPN			
Q052	2SA1323(B)	TR. SI, PNP			
Q053	2SA1323(B)	TR. SI, PNP			
Q054	2SC3354(T,S)	TR. SI, NPN			
Q055	2SC3354(T,S)	TR. SI, NPN			
Q056	2SC2671(H)	TR. SI, NPN			
Q057	2SC2671(H)	TR. SI, NPN			
Q058	2SC2671(H)	TR. SI, NPN			
Q059	2SC2671(H)	TR. SI, NPN			
Q060	2SC3315(C,D)	TR. SI, NPN			
Q061	2SC3354(T,S)	TR. SI, NPN			
Q062	2SC3354(T,S)	TR. SI, NPN			
Q063	2SC3354(T,S)	TR. SI, NPN			
Q064	2SA1309(Q,R)	TR. SI, PNP			
Q065	2SC3354(T,S)	TR. SI, NPN			
Q066	2SC3354(T,S)	TR. SI, NPN			
Q067	2SA1161	TR. SI, PNP			
Q068	2SA1161	TR. SI, PNP			
Q069	2SC3315(C,D)	TR. SI, NPN			
Q070	2SC3315(C,D)	TR. SI, NPN			
Q071	2SA1309(Q,R)	TR. SI, PNP			
Q072	2SC3311(R)	TR. SI, NPN			
Q073	2SA1161	TR. SI, PNP			
Q074	2SA1161	TR. SI, PNP			
Q075	2SC3311(R)	TR. SI, NPN			
Q076	2SC2671(H)	TR. SI, NPN			
Q077	2SC2671(H)	TR. SI, NPN			
Q078	2SC3311(R)	TR. SI, NPN			
Q079	2SC2671(H)	TR. SI, NPN			
Q080	2SC2671(H)	TR. SI, NPN			
Q081	2SC3311(R)	TR. SI, NPN			
Q082	2SA1309(Q,R)	TR. SI, PNP			
Q083	2SA1309(Q,R)	TR. SI, PNP			
Q084	2SA1309(Q,R)	TR. SI, PNP			
Q085	2SA1309(Q,R)	TR. SI, PNP			
Q086	2SC3311(R)	TR. SI, NPN			
Q087	2SC3311(R)	TR. SI, NPN			
R001	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
R002	RN14BK2E1803D	RES. METAL FILM	180K	0.5%	1/4W
R003	RN14BK2E8203D	RES. METAL FILM	820K	0.5%	1/4W
R004	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R005	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R006	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R007	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R008	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R009	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R010	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R011	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R012	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R013	RN14BK2C1100F	RES. METAL FILM	110	1%	1/6W
R014	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R015	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R017	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R018	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R019	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R020	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R021	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R022	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R023	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R024	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R025	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R026	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R027	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
R028	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R029	RD14BB2C204J	RES. CARBON	200K	5%	1/6W
R030	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R031	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R032	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R033	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R034	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R035	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R036	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R037	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R038	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R039	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R040	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R041	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R042	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R043	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R044	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R045	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R046	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R047	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R048	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R049	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R050	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R051	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R052	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R053	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R054	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R055	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R056	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R057	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R058	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R059	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R060	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R061	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R062	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R063	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R064	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R065	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R066	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R067	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R068	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R069	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R070	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R071	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R072	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R073	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R074	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R075	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R076	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R077	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R078	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R079	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R080	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R081	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R082	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R083	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R084	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R085	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R086	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R087	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R088	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R089	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R090	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R091	NO USE				
R092	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R093	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R094	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R095	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R096	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R097	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R098	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R099	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R100	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R101	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R102	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R103	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R104	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R105	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R106	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R107	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R108	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R109	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R110	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
R111	RN14BK2E1803D	RES. METAL FILM	180K	0.5%	1/4W
R112	RN14BK2E8203D	RES. METAL FILM	820K	0.5%	1/4W
R113	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R114	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R115	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R116	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R117	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R118	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R119	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R120	RD14BB2C470J	RES. CARBON	47	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R121	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R122	RN14BK2C1100F	RES. METAL FILM	110	1%	1/6W
R123	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R124	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R125	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R126	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R127	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R128	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R129	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R130	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R131	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R132	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R133	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R134	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R135	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R136	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
R137	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R138	RD14BB2C204J	RES. CARBON	200K	5%	1/6W
R139	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R140	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R141	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R142	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R143	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R144	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R145	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R146	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R147	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R148	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R149	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R150	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R151	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R152	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R153	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R154	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R155	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R156	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R157	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R158	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R159	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R160	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R161	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R162	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R163	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R164	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R165	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R166	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R167	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R168	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R169	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R170	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R171	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R172	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R173	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R174	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R175	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R176	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R177	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R178	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R179	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R180	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R181	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R182	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R183	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R184	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R185	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R186	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R187	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R188	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R189	NO USE				
R190	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R191	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R192	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R193	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R194	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R195	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R196	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R197	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R198	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R199	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R200	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R201	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R202	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R203	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R204	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R205	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R206	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R207	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R208	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R209	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R210	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R211	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R212	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R213	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R214	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R215	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R216	RD14BB2C471J	RES. CARBON	470	5%	1/6W
REF.NO	PARTS NO	NAME & DESCRIPTION			
R217	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R218	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R219	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R220	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R221	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R222	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R223	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R224	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R225	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R226	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R227	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R228	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R229	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R230	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R231	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R232	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R233	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R234	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R235	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R236	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R237	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R238	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R239	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R240	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R241	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R242	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R243	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R244	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R245	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R246	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R247	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R248	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R249	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R250	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R251	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
R252	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R253	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
R254	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R255	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R256	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R257	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R258	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R259	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R260	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R261	NO USE				
R262	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R263	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R264	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R265	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R266	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R267	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R268	NO USE				
R269	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R270	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R271	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R272	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R273	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R274	NO USE				
R275	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R276	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R277	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R278	NO USE				
R279	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R280	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R281	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R282	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R283	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R284	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R285	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R286	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R287	NO USE				
R288	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R289	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R290	NO USE				
R291	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R292	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R293	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R294	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R295	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R296	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R297	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R298	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R299	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R300	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R301	NO USE				
R302	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R303	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R304	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R305	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R306	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R307	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R308	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R309	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R310	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R311	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R312	RD14BB2C102J	RES. CARBON	1K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R313	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R314	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R315	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R316	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R317	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R318	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R319	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R320	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R321	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R322	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R323	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R324	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R325	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R326	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R327	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R328	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R329	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R330	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R331	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R332	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R333	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R334	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R335	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R336	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R337	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R338	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R339	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R340	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R341	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R342	NO USE				
R343	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R344	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R345	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R346	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R347	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R348	RD14BB2C510J	RES. CARBON	51	5%	1/6W
TC001	C05-0309-05	CAP. TRIMMER	40P		
TC002	C05-0031-15	CAP. TRIMMER	10P		
TC003	C05-0031-15	CAP. TRIMMER	10P		
TC004	C05-0030-15	CAP. TRIMMER	20P		
TC005	C05-0309-05	CAP. TRIMMER	40P		
TC006	C05-0031-15	CAP. TRIMMER	10P		
TC007	C05-0031-15	CAP. TRIMMER	10P		
TC008	C05-0031-15	CAP. TRIMMER	10P		
TC009	C05-0031-15	CAP. TRIMMER	10P		
TP001	E23-0508-04	TEST TERMINAL			
TP002	E23-0508-04	TEST TERMINAL			
TP003	E40-0211-05	PIN CONNECTOR	2 P		
VR001	R12-0539-05	RES. SEMI FIXED	200 B		
VR002	R12-3520-05	RES. SEMI FIXED	10K B		
VR003	NO USE				
VR004	R12-0421-05	RES. SEMI FIXED	100 B		
VR005	R12-0421-05	RES. SEMI FIXED	100 B		
VR006	R12-0421-05	RES. SEMI FIXED	100 B		
VR007	R12-0421-05	RES. SEMI FIXED	100 B		
VR008	R12-0539-05	RES. SEMI FIXED	200 B		
VR009	R12-3520-05	RES. SEMI FIXED	10K B		
VR010	R12-3520-05	RES. SEMI FIXED	10K B		
VR011	R12-0539-05	RES. SEMI FIXED	200 B		
VR012	R12-3520-05	RES. SEMI FIXED	10K B		
VR013	NO USE				
VR014	R12-0421-05	RES. SEMI FIXED	100 B		
VR015	R12-0421-05	RES. SEMI FIXED	100 B		
VR016	R12-0421-05	RES. SEMI FIXED	100 B		
VR017	R12-0421-05	RES. SEMI FIXED	100 B		
VR018	R12-0421-05	RES. SEMI FIXED	100 B		
VR019	R12-3520-05	RES. SEMI FIXED	10K B		
VR020	R12-0539-05	RES. SEMI FIXED	200 B		
VR021	R12-0540-05	RES. SEMI FIXED	500 B		
VR022	R12-0539-05	RES. SEMI FIXED	200 B		
VR023	R12-0540-05	RES. SEMI FIXED	500 B		
VR024	R12-0539-05	RES. SEMI FIXED	200 B		
VR025	R12-0539-05	RES. SEMI FIXED	200 B		

VERTICAL OUTPUT AMP UNIT

X73-1510-00

	REF.NO	PARTS NO	NAME & DESCRIPTION			
		E23-0512-05	TERMINAL			
		F02-0501-04	HEAT SINK			
		F02-0502-05	HEAT SINK			
		J25-5039-12	PCB (UNMOUNTED)			
		L92-0110-05	BEAD CORE			
		N09-0709-05	SCREW			
		N89-3006-46	SCREW, BINDING TAP TITE			
		Z12-2014-05	TUBE (PLASTIC)			
C-1	C001	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C-2	C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
E-2	C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C004	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
—	C005	NO USE				
D-2	C006	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
E-2	C007	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
D-2	C008	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
B-2	C009	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C012	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
D-3	C013	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
B-3	C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C-3	C015	CE04FW1V330M	CAP. ELECTRO	33	20%	35V
C-3	C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-3	C017	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-2	C018	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C-1	C019	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
B-1	C020	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
—	C021	NO USE				
A-3	C022	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
A-3	C023	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
E-2	C024	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
E-3	C025	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
B-1	C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
B-2	D001	MTZ24JC	DIODE, ZENER	24V		
D-1	D002	1S2686	DIODE			
D-2	D003	1S2686	DIODE			
E-1	L001	L33-0806-05	CHOKE COIL			
E-3	L002	L33-0806-05	CHOKE COIL			
E-3	L003	L40-2282-13	FERRI INDUCTOR	0.22UH		
E-3	L004	L40-2282-13	FERRI INDUCTOR	0.22UH		
D-3	L005	L40-4701-03	FERRI INDUCTOR	47UH		
C-3	L006	L40-4701-03	FERRI INDUCTOR	47UH		
C-3	L007	L40-4701-03	FERRI INDUCTOR	47UH		
A-3	L008	L40-4701-03	FERRI INDUCTOR	47UH		
	L009	NO USE				
	P010	E40-0315-05	PIN CONNECTOR	3P		
	P013	E40-0273-05	PIN CONNECTOR	2 CONTACT		
	P020	E40-0573-05	PIN CONNECTOR	5 CONTACT		
	P021	NO USE				
	P022	E40-0773-05	PIN CONNECTOR	7P		
B-1	Q001	2SC2671(H)	TR. SI, NPN			
B-2	Q002	2SC2671(H)	TR. SI, NPN			
C-1	Q003	2SA1206	TR. SI, PNP			
C-2	Q004	2SA1206	TR. SI, PNP			
C-1	Q005	2SC2671(H)	TR. SI, NPN			
C-3	Q006	2SC2671(H)	TR. SI, NPN			
C-1	Q007	2SC2644	TR. SI, NPN			
C-1	Q008	2SC2644	TR. SI, NPN			
C-3	Q009	2SC2644	TR. SI, NPN			
C-3	Q010	2SC2644	TR. SI, NPN			
E-1	Q011	2SC1164	TR. SI, NPN			
E-3	Q012	2SC1164	TR. SI, NPN			
B-2	Q013	2SA1309(Q,R)	TR. SI, PNP			
B-2	Q014	2SC3311(Q,R)	TR. SI, NPN			
B-2	Q015	2SA1309(Q,R)	TR. SI, PNP			
C-2	Q016	2SA1309(Q,R)	TR. SI, PNP			
C-3	Q017	2SC3311(Q,R)	TR. SI, NPN			
B-2	Q018	2SA1309(Q,R)	TR. SI, PNP			
A-2	R001	RN14BK2C2000F	RES. METAL FILM	200	1%	1/6W
A-1	R002	RD14BB2C220J	RES. CARBON	22	5%	1/6W
A-2	R003	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-1	R004	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
B-1	R005	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
B-2	R006	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
B-1	R007	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R008	RD14BB2C470J	RES. CARBON	47	5%	1/6W
C-2	R009	RD14BB2C101J	RES. CARBON	100	5%	1/6W
C-2	R010	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
C-2	R011	RN14BK2E3900F	RES. METAL FILM	390	1%	1/4W
C-1	R012	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R013	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-2	R014	RD14BB2E361J	RES. CARBON	360	5%	1/4W
C-2	R015	RD14BB2E361J	RES. CARBON	360	5%	1/4W
C-1	R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W

PARTS LIST

	REF.NO	PARTS NO	NAME & DESCRIPTION			
C-1	R017	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R018	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
—	R020	NO USE				
D-2	R021	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
—	R022	NO USE				
D-2	R023	RD14BB2C681J	RES. CARBON	680	5%	1/6W
C-2	R024	RN14BK2E68R0F	RES. METAL FILM	68.0	1%	1/4W
C-2	R025	RN14BK2E68R0F	RES. METAL FILM	68.0	1%	1/4W
C-2	R026	RD14BB2E8R2J	RES. CARBON	8.2	5%	1/4W
D-1	R027	RD14CB2E220J	RES. CARBON	22	5%	1/4W
D-3	R028	RD14CB2E220J	RES. CARBON	22	5%	1/4W
E-2	R029	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R030	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-2	R031	RS14AB3H561J	RES. METAL FILM	560	5%	5W
E-2	R032	RS14AB3H561J	RES. METAL FILM	560	5%	5W
E-1	R033	RD14BB2C471J	RES. CARBON	470	5%	1/6W
E-3	R034	RD14BB2C471J	RES. CARBON	470	5%	1/6W
B-2	R035	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
B-2	R036	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
B-2	R037	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-2	R038	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
B-2	R039	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
A-2	R040	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
B-3	R041	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
C-2	R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
B-2	R043	RN14BK2C47R0F	RES. METAL FILM	47.0	1%	1/6W
B-2	R044	RD14BB2C220J	RES. CARBON	22	5%	1/6W
C-3	R045	RN14BK2C47R0F	RES. METAL FILM	47.0	1%	1/6W
B-2	R046	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
C-3	R047	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
C-3	R048	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
C-3	R049	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-3	R050	RD14BB2C470J	RES. CARBON	47	5%	1/6W
B-2	R051	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
B-2	R052	RD14BB2C131J	RES. CARBON	130	5%	1/6W
D-2	R053	RD14BB2C101J	RES. CARBON	100	5%	1/6W
D-1	R054	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
B-1	R055	RD14BB2C681J	RES. CARBON	680	5%	1/6W
B-2	R056	RD14BB2C681J	RES. CARBON	680	5%	1/6W
D-1	R057	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
	R058	RD14BB2C101J	RES. CARBON	100	5%	1/6W
B-1	TC001	C05-0412-05	CAP. TRIMMER	20P		
B-1	TC002	C05-0412-05	CAP. TRIMMER	20P		
D-1	TH001	SDT1000	THERMISTOR			
B-2	VR001	R12-0543-05	RES. SEMI FIXED	500 B		
C-2	VR002	R12-0543-05	RES. SEMI FIXED	500 B		
A-2	VR003	R12-0543-05	RES. SEMI FIXED	500 B		

CH3, CH4 AMP UNIT

X73-1520-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J21-2990-04	MOUNTING HARDWEAR			
	J25-5039-22	PCB (UNMOUNTED)			
	N09-0709-05	SCREW			
C001	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C004	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C005	CC45SL1H101J	CAP. CERAMIC	100P	5%	50V
C006	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
C007	NO USE				
C008	CC45CH1H390J	CAP. CERAMIC	39P	5%	50V
C009	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C011	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C012	CC45SL1H101J	CAP. CERAMIC	100P	5%	50V
C013	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V
C014	NO USE				
C015	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C016	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C017	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C020	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C021	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C022	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
C035	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
D001	1SS132	DIODE			
D002	1S1544A	DIODE			
D003	1SS132	DIODE			
D004	1S1544A	DIODE			
D005	1SS132	DIODE			
D006	1SS132	DIODE			
D007	1SS132	DIODE			
D008	1SS132	DIODE			
D009	1SS132	DIODE			
L001	L40-2201-03	FERRI INDUCTOR	22UH		
L002	L40-2201-03	FERRI INDUCTOR	22UH		
L003	L40-2201-03	FERRI INDUCTOR	22UH		
P011	E40-0473-05	PIN CONNECTOR	4 P		
P012	E40-0473-05	PIN CONNECTOR	4 P		
P017	E40-0273-05	PIN CONNECTOR	2 P		
P018	E40-0273-05	PIN CONNECTOR	2 P		
P048	E40-1816-05	PIN CONNECTOR	18P		
P054	E40-7414-05	PIN CONNECTOR	14P		
P055	E40-7416-05	PIN CONNECTOR	16P		
P056	E23-0503-05	TERMINAL			
P057	NO USE				
P058	E40-0273-05	PIN CONNECTOR	2 P		
P059	NO USE				
P060	E23-0503-05	TERMINAL			
P061	E40-7416-05	PIN CONNECTOR	16P		
Q001	2SD438(F)	TR. SI, NPN			
Q002	DN1901	FET, DUAL SI, N-CHANNEL			
Q003	2SC3354(T,S)	TR. SI, NPN			
Q004	2SC3354(T,S)	TR. SI, NPN			
Q005	2SA1206	TR, SI, PNP			
Q006	2SA1206	TR, SI, PNP			
Q007	2SC2671(H)	TR. SI, NPN			
Q008	2SC2671(H)	TR. SI, NPN			
Q009	2SD438(F)	TR. SI, NPN			
Q010	DN1901	FET, DUAL SI, N-CHANNEL			
Q011	2SC3354(T,S)	TR. SI, NPN			
Q012	2SC3354(T,S)	TR. SI, NPN			
Q013	2SA1206	TR, SI, PNP			
Q014	2SA1206	TR, SI, PNP			
Q015	2SC2671(H)	TR. SI, NPN			
Q016	2SC2671(H)	TR. SI, NPN			
R001	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R002	RN14BK2E9003D	RES. METAL FILM	900K	0.5%	1/4W
R003	RN14BK2E1113D	RES. METAL FILM	111K	0.5%	1/4W
R004	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R005	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R006	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R007	RD14BB2E684J	RES. CARBON	680K	5%	1/4W
R008	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R009	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R010	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R011	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R012	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R013	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R014	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R015	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R016	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R017	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R018	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R019	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R020	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R021	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R022	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R023	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R024	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R025	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R026	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R027	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R028	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R029	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R030	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R031	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R032	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R033	RN14BK2E9003D	RES. METAL FILM	900K	0.5%	1/4W
R034	RN14BK2E1113D	RES. METAL FILM	111K	0.5%	1/4W
R035	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R036	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R037	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R038	NO USE				
R039	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R040	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R041	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R043	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R044	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R045	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R046	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R047	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R048	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R049	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R050	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R051	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R052	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R053	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R054	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R055	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R056	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R057	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R058	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R059	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R060	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R061	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R062	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R063	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R064	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R065	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R066	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R067	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R068	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R069	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R070	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R071	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R072	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R073	RD14BB2C121J	RES. CARBON	120	5%	1/6W
R074	RD14BB2C121J	RES. CARBON	120	5%	1/6W
R075	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R076	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R077	RD14BB2C330J	RES. CARBON	33	5%	1/6W
RL001	S51-2505-05	RELAY			
RL002	S51-2505-05	RELAY			
TC002	C05-0062-05	CAP. TRIMMER	6P		
TC003	C05-0031-15	CAP. TRIMMER	10P		
TC004	C05-0030-15	CAP. TRIMMER	20P		
TC005	NO USE				
TC006	C05-0062-05	CAP. TRIMMER	6P		
TC007	C05-0031-15	CAP. TRIMMER	10P		
TC008	C05-0030-15	CAP. TRIMMER	20P		
VR001	R12-0421-05	RES. SEMI FIXED	100 B		
VR002	R12-0421-05	RES. SEMI FIXED	100 B		

CPU UNIT

X81-1320-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J25-5038-22	PCB (UNMOUNTED)			
C001	CE04W1A470M	CAP. ELECTRO	47	20%	10V
C002	CC45SL1H820J	CAP. CERAMIC	82P	5%	50V
C003	CE04W1H2R2M	CAP. ELECTRO	2.2	20%	50V
C004	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C005	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
D001	1SS132	DIODE			
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	1SS132	DIODE			
IC001	MTM5010	MPU, 4-BIT MICROCOMPUTER			
IC002	AN90B20	IC, TR. ARRAY			
IC003	AN90B20	IC, TR. ARRAY			
J001	E31-2429-05	LEAD WIRE WITH CONNECTOR			
P002	E40-1274-05	PIN CONNECTOR			
P049	E40-0273-05	PIN CONNECTOR	2 P		
P061	E40-7516-05	PIN CONNECTOR	16P		
P062	E40-7526-05	PIN CONNECTOR	26P		
Q001	2SA1309(Q,R)	TR. SI, PNP			
Q002	2SC3311(R)	TR. SI, NPN			
R001	RD14BB2C621J	RES. CARBON	620	5%	1/6W
R002	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R003	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R004	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R005	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R006	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R007	RD14BB2C621J	RES. CARBON	620	5%	1/6W
R008	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R009	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R010	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R011	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R012	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R013	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R014	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R015	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R016	RD14BB2C103J	RES. CARBON	10K	5%	1/6W

SWEEP ROTARY UNIT

X74-1310-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-2336-15	LEAD WIRE WITH CONNECTOR			
	F20-0640-04	INSULATOR			
	J25-2971-03	PCB (UNMOUNTED)			
	001-0004-05	COATING WIRE			
D001	1SS132	DIODE			
D002	1SS135	DIODE			
D003	1SS135	DIODE			
D004	1SS135	DIODE			
D005	1SS135	DIODE			
D006	1SS135	DIODE			
D007	1SS135	DIODE			
D008	1SS135	DIODE			
D009	1SS132	DIODE			
D010	1SS135	DIODE			
D011	1SS135	DIODE			
D012	1SS135	DIODE			
D013	1SS135	DIODE			
D014	1SS135	DIODE			
D015	1SS135	DIODE			
D016	1SS135	DIODE			
P015	E40-0973-05	PIN CONNECTOR	9 P		
P019	E40-1073-05	PIN CONNECTOR	10P		
P040	E40-0873-05	PIN CONNECTOR	8 P		
P041	E40-0873-05	PIN CONNECTOR	8 P		
P042	E40-0473-05	PIN CONNECTOR	4 P		
P051	E40-0773-05	PIN CONNECTOR	7 P		
P057	E40-0373-05	PIN CONNECTOR	3 P		
R001	RN14BK2B3603F	RES. METAL FILM	360K	1%	1/8W
R002	RN14BK2B1203F	RES. METAL FILM	120K	1%	1/8W
R003	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
R004	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
R005	RN14BK2B3602F	RES. METAL FILM	36K	1%	1/8W
R006	RN14BK2B1202F	RES. METAL FILM	12K	1%	1/8W
R007	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
R008	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
R009	RN14BK2B3601F	RES. METAL FILM	3.6K	1%	1/8W
R010	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R011	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R012	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R013	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R014	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R015	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R016	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R017	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R018	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R019	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R020	RN14BK2B3603F	RES. METAL FILM	360K	1%	1/8W
R021	RN14BK2B1203F	RES. METAL FILM	120K	1%	1/8W
R022	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
R023	RN14BK2B3002F	RES. METAL FILM	30K	1%	1/8W
R024	RN14BK2B3602F	RES. METAL FILM	36K	1%	1/8W
R025	RN14BK2B1202F	RES. METAL FILM	12K	1%	1/8W
R026	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
R027	RN14BK2B3001F	RES. METAL FILM	3K	1%	1/8W
R028	RN14BK2B3601F	RES. METAL FILM	3.6K	1%	1/8W
R029	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R030	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R031	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R032	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R033	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R034	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R035	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R036	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R037	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R038	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
S001	S02-2503-05	ROTARY SWITCH			
S002	S02-2503-05	ROTARY SWITCH			
S003	S02-2503-05	ROTARY SWITCH			
S004	S02-2503-05	ROTARY SWITCH			
VR001	S02-2503-05	ROTARY SWITCH			

PARTS LIST

TRIG SWEEP UNIT

X74-1350-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E33-4046-00	WIRE ASSY			
	J25-5039-22	PCB (UNMOUNTED)			
	R92-0150-05	JUMPING RES.	ZERO OHM		
	212-1018-05	TUBE (PLASTIC)			
	212-2014-05	TUBE (PLASTIC)			
	420-0008-05	ADHESIVES			
C001	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
C002	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C003	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C004	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C005	C91-0549-05	CAP. TANTALUM	1	20%	35V
C006	NO USE				
C007	CE04FW1V220M	CAP. ELECTRO	22	20%	35V
C008	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C009	C91-0549-05	CAP. TANTALUM	1	20%	35V
C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C012	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
C013	C91-0583-05	CAP. PLASTIC	10	10%	
C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	CQ93M1H333K	CAP. MYLAR	0.033	10%	50V
C017	C91-0584-05	CAP. CERAMIC	0.1	5%	
C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C019	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C020	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
C021	C91-0581-05	CAP. CERAMIC	1000P	10%	
C022	NO USE				
C023	CM93BD2A121J	CAP. MICA	120P	5%	100V
C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C025	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
C026	NO USE				
C027	C91-0549-05	CAP. TANTALUM	1	20%	35V
C028	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
C029	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C031	CC45SL1H330J	CAP. CERAMIC	33P	5%	50V
C032	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C033	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C034	C91-0549-05	CAP. TANTALUM	1	20%	35V
C035	NO USE				
C036	CE04FW1V220M	CAP. ELECTRO	22	20%	35V
C037	C91-0549-05	CAP. TANTALUM	1	20%	35V
C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C039	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C040	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
C041	C91-0583-05	CAP. PLASTIC	10	10%	
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C044	CQ93M1H333K	CAP. MYLAR	0.033	10%	50V
C045	C91-0584-05	CAP. CERAMIC	0.1	5%	
C046	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C048	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
C049	C91-0581-05	CAP. CERAMIC	1000P	10%	
C050	NO USE				
C051	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C052	CC45SL1H121J	CAP. CERAMIC	120P	5%	50V
C053	CM93BD2A121J	CAP. MICA	120P	5%	100V
C054	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C055	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C056	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C057	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C058	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C059	CK45B1H681K	CAP. CERAMIC	680P	10%	50V
C060	CM93BD2A470J	CAP. MICA	47P	5%	100V
C061	CM93BD2A390J	CAP. MICA	39P	5%	100V
C062	CC45SL1H220J	CAP. CERAMIC	22P	5%	50V
C063	CQ93M1H102J	CAP. MYLAR	1000P	5%	50V
C064	CQ93M1H102J	CAP. MYLAR	1000P	5%	50V
C065	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C066	CQ93M1H472J	CAP. MYLAR	4700P	5%	50V
C067	CQ93M1H472J	CAP. MYLAR	4700P	5%	50V
C068	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C069	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
C070	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C071	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C072	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C073	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C074	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C075	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C076	CE04W1C101M	CAP. ELECTRO	100	20%	16V
C077	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C078	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C079	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C080	CE04W1C101M	CAP. ELECTRO	100	20%	16V
C081	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C082	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C083	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C084	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C085	CE04W1A470M	CAP. ELECTRO	47	20%	10V
C086	CE04W1A101M	CAP. ELECTRO	100	20%	10V
C087	CE04W1A101M	CAP. ELECTRO	100	20%	10V
C088	CE04W1A101M	CAP. ELECTRO	100	20%	10V
C089	CE04W1A221M	CAP. ELECTRO	220	20%	10V
C090	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C091	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C092	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C093	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C094	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C095	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C096	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C097	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C098	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C099	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C100	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C101	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C102	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C103	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C104	CE04W1E220M	CAP. ELECTRO	22	20%	25V
C105	CE04W1E220M	CAP. ELECTRO	22	20%	25V
C106	CE04W1E220M	CAP. ELECTRO	22	20%	25V
C107	NO USE				
C108	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C109	CE04FW1E330M	CAP. ELECTRO	33	20%	25V
C110	CE04W1J4R7M	CAP. ELECTRO	4.7	20%	63V
C111	CE04W1J100M	CAP. ELECTRO	10	20%	63V
C112	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C113	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C114	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C115	NO USE				
C116	CE04FW1C470M	CAP. ELECTRO	47	20%	16V
C117	CC45SL1H220J	CAP. CERAMIC	22P	5%	50V
C118	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	1SS132	DIODE			
D005	MTZ3.0JB	DIODE ZENER	3.0V		
D006	1SS132	DIODE			
D007	1SS132	DIODE			
D008	1SS132	DIODE			
D009	1SS132	DIODE			
D010	1SS132	DIODE			
D011	1SS132	DIODE			
D012	1SS132	DIODE			
D013	MTZ16JA	DIODE ZENER	15V		
D014	1SS132	DIODE			
D015	1SS132	DIODE			
D016	1SS132	DIODE			
D017	1SS132	DIODE			
D018	1SS132	DIODE			
D019	1SS132	DIODE			
D020	1SS132	DIODE			
D021	1SS132	DIODE			
D022	1SS132	DIODE			
D023	1SS132	DIODE			
D024	1SS132	DIODE			
D025	1SS132	DIODE			
D026	1SS132	DIODE			
D027	1SS132	DIODE			
D028	1SS132	DIODE			
D029	1SS132	DIODE			
D030	1SS132	DIODE			
D031	NO USE				
D032	1SS132	DIODE			
D033	1SS132	DIODE			
D034	1SS132	DIODE			
D035	1SS132	DIODE			
D036	1SS132	DIODE			
D037	1SS132	DIODE			
D038	1SS132	DIODE			
D039	1SS132	DIODE			
D040	1SS132	DIODE			
D041	1SS132	DIODE			
D042	1SS132	DIODE			
D043	MTZ16JA	DIODE ZENER	15V		
D044	MTZ3.0JB	DIODE ZENER	3.0V		
D045	1SS132	DIODE			
D046	1SS132	DIODE			
D047	1SS132	DIODE			
D048	1SS132	DIODE			
D049	1SS132	DIODE			
D050	1SS132	DIODE			
D051	1SS132	DIODE			
D052	1SS132	DIODE			
D053	MTZ12JC	DIODE ZENER	12V		
D054	MTZ12JC	DIODE ZENER	12V		
D055	SV06Y	DIODE			
D056	1SS132	DIODE			
D057	1SS132	DIODE			
D058	1SS132	DIODE			
D059	1SS132	DIODE			
D060	SV06Y	DIODE			
D061	1SS132	DIODE			
D062	1SS132	DIODE			
D063	1SS132	DIODE			

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
D064	1SS132	DIODE
D065	1SS132	DIODE
D066	1SS132	DIODE
D067	1SS132	DIODE
D068	1SS132	DIODE
D069	1SS132	DIODE
D070	NO USE	
D071	1SS132	DIODE
D072	1SS132	DIODE
D073	1N60	DIODE
D074	1SS132	DIODE
D075	1SS132	DIODE
D076	1SS132	DIODE
D077	1SS132	DIODE
IC001	MC10H103L	IC, QUAD 2-INPUT OR GATE
IC002	MC10H131L	IC, DUAL D-FFS
IC003	LF412CN	IC, DUAL JFET INPUT OP-AMP
IC004	MC10H103L	IC, QUAD 2-INPUT OR GATE
IC005	MC10H131L	IC, DUAL D-FFS
IC006	LF412CN	IC, DUAL JFET INPUT OP-AMP
IC007	MC10104L	IC, QUAD 2-INPUT AND GATE
IC008	MC10103L	IC, QUAD 2-INPUT OR GATE
IC009	MC10104L	IC, QUAD 2-INPUT AND GATE
IC010	MC10104L	IC, QUAD 2-INPUT AND GATE
IC011	MC10104L	IC, QUAD 2-INPUT AND GATE
IC012	MC10102L	IC, QUAD 2-INPUT NOR GATE
IC013	MC10131L	IC, DUAL D-FFS
IC014	SN7406N	IC, HEX O.C.INVERTERS
IC015	MC10104L	IC, QUAD 2-INPUT AND GATE
IC016	MC78L05CP	VOLTAGE REGULATOR (5V, 100MA)
IC017	MC78L15ACP	VOLTAGE REGULATOR (5V, 100MA)
L001	L40-1001-01	FERRI INDUCTOR 10UH
L002	L40-1001-01	FERRI INDUCTOR 10UH
L003	L40-2201-03	FERRI INDUCTOR 22UH
P013	E40-0273-05	PIN CONNECTOR 2 P
P014	E40-0773-05	PIN CONNECTOR 7 P
P028	E40-0473-05	PIN CONNECTOR 4 P
P035	E40-0473-05	PIN CONNECTOR 4 P
P036	E40-0673-05	PIN CONNECTOR 6 P
P037	E40-0773-05	PIN CONNECTOR 7 P
P038	E40-0373-05	PIN CONNECTOR 3 P
P039	E40-0773-05	PIN CONNECTOR 7 P
P040	E40-0873-05	PIN CONNECTOR 8 P
P041	E40-0873-05	PIN CONNECTOR 8 P
P042	E40-0473-05	PIN CONNECTOR 4 P
P043	E40-0273-05	PIN CONNECTOR 2 P
P044	E40-0274-05	PIN CONNECTOR 2 P
P045	E40-0473-05	PIN CONNECTOR 4 P
P046	E40-0274-05	PIN CONNECTOR 2 P
P047	E40-0473-05	PIN CONNECTOR 4 P
P048	E40-1811-05	PIN CONNECTOR 18 P
P049	NO USE	
P050	E40-0473-05	PIN CONNECTOR 4 P
P051	NO USE	
P052	E40-0273-05	PIN CONNECTOR 2 P
P053	E40-0273-05	PIN CONNECTOR 2 P
P057	E40-0373-05	PIN CONNECTOR 3 P
Q001	2SC3311(R)	TR. SI, NPN
Q002	2SC3311(R)	TR. SI, NPN
Q003	2SC3311(R)	TR. SI, NPN
Q004	2SA1323(B)	TR. SI, PNP
Q005	2SC3354(T,S)	TR. SI, NPN
Q006	2SC1973(T)	TR. SI, NPN
Q007	2SA1309(Q,R)	TR. SI, PNP
Q008	2SD438(F)	TR. SI, NPN
Q009	2SC3311(R)	TR. SI, NPN
Q010	2SC3311(R)	TR. SI, NPN
Q011	2SC3311(R)	TR. SI, NPN
Q012	2SC3311(R)	TR. SI, NPN
Q013	2SC3311(R)	TR. SI, NPN
Q014	2SC3311(R)	TR. SI, NPN
Q015	2SC3311(R)	TR. SI, NPN
Q016	2SC3311(R)	TR. SI, NPN
Q017	2SC3311(R)	TR. SI, NPN
Q018	M47F(C)	FET
Q019	2SC3315(C,D)	TR. SI, NPN
Q020	2SA1309(Q,R)	TR. SI, PNP
Q021	M47F(C)	FET
Q022	2SC3315(C,D)	TR. SI, NPN
Q023	2SC3311(R)	TR. SI, NPN
Q024	2SC3311(R)	TR. SI, NPN
Q025	2SC3311(R)	TR. SI, NPN
Q026	2SC3311(R)	TR. SI, NPN
Q027	2SA1323(B)	TR. SI, PNP
Q028	2SA1323(B)	TR. SI, PNP
Q029	2SA1323(B)	TR. SI, PNP
Q030	2SA1323(B)	TR. SI, PNP
Q031	2SC3311(R)	TR. SI, NPN
Q032	2SC3311(R)	TR. SI, NPN

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q033	2SC3311(R)	TR. SI, NPN			
Q034	2SA1323(B)	TR. SI, PNP			
Q035	2SC3354(T,S)	TR. SI, NPN			
Q036	2SC1973(T)	TR. SI, NPN			
Q037	2SA1309(Q,R)	TR. SI, PNP			
Q038	2SD438(F)	TR. SI, NPN			
Q039	2SC3311(R)	TR. SI, NPN			
Q040	2SC3311(R)	TR. SI, NPN			
Q041	2SC3311(R)	TR. SI, NPN			
Q042	2SC3311(R)	TR. SI, NPN			
Q043	2SC3311(R)	TR. SI, NPN			
Q044	2SC3311(R)	TR. SI, NPN			
Q045	2SC3311(R)	TR. SI, NPN			
Q046	2SC3311(R)	TR. SI, NPN			
Q047	2SC3311(R)	TR. SI, NPN			
Q048	M47F(C)	FET			
Q049	2SC3315(C,D)	TR. SI, NPN			
Q050	2SA1309(Q,R)	TR. SI, PNP			
Q051	M47F(C)	FET			
Q052	2SC3315(C,D)	TR. SI, NPN			
Q053	2SC3311(R)	TR. SI, NPN			
Q054	2SC3311(R)	TR. SI, NPN			
Q055	2SC3315(C,D)	TR. SI, NPN			
Q056	2SC3315(C,D)	TR. SI, NPN			
Q057	2SC3315(C,D)	TR. SI, NPN			
Q058	2SC3315(C,D)	TR. SI, NPN			
Q059	2SC3315(C,D)	TR. SI, NPN			
Q060	2SC3315(C,D)	TR. SI, NPN			
Q061	2SC3315(C,D)	TR. SI, NPN			
Q062	2SA1239(F)	TR. SI, PNP-DUAL			
Q063	NO USE				
Q064	2SC3315(C,D)	TR. SI, NPN			
Q065	2SC3315(C,D)	TR. SI, NPN			
Q066	2SC3315(C,D)	TR. SI, NPN			
Q067	2SC3315(C,D)	TR. SI, NPN			
Q068	2SC3311(R)	TR. SI, NPN			
Q069	2SC3311(R)	TR. SI, NPN			
Q070	2SC3315(C,D)	TR. SI, NPN			
Q071	2SC3315(C,D)	TR. SI, NPN			
Q072	2SA1323(B)	TR. SI, PNP			
Q073	2SC3354(T,S)	TR. SI, NPN			
Q074	2SA1323(B)	TR. SI, PNP			
Q075	2SC3354(T,S)	TR. SI, NPN			
Q076	2SA1309(Q,R)	TR. SI, PNP			
Q077	2SA1323(B)	TR. SI, PNP			
Q078	2SC3311(R)	TR. SI, NPN			
Q079	2SA1309(Q,R)	TR. SI, PNP			
Q080	2SA1309(Q,R)	TR. SI, PNP			
Q081	2SA1309(Q,R)	TR. SI, PNP			
Q082	2SA1309(Q,R)	TR. SI, PNP			
Q083	2SA1323(B)	TR. SI, PNP			
Q084	2SA1323(B)	TR. SI, PNP			
R001	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R002	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R003	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R004	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R005	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R006	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R007	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R008	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R009	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R010	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R011	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R012	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R013	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R014	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R015	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R016	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R017	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R018	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R019	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R020	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R021	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R022	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R023	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R024	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R025	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R026	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R027	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R028	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R029	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R030	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R031	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R032	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R033	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R034	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R035	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R036	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R037	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R038	RN14BK2C2402F	RES. METAL FILM	24K	1%	1/6W
R039	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R040	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R041	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R042	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R043	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R044	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R045	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R046	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R047	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R048	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R049	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R050	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R051	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R052	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R053	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R054	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R055	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R056	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R057	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R058	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R059	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R060	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R061	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R062	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R063	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R064	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R065	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R066	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R067	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R068	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R069	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R070	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R071	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R072	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R073	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R074	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R075	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R076	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R077	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R078	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R079	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R080	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R081	NO USE				
R082	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R083	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R084	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
R085	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R086	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R087	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R088	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R089	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R090	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R091	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R092	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R093	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R094	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R095	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R096	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R097	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R098	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R099	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R100	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R101	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R102	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R103	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R104	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R105	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R106	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R107	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R108	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R109	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R110	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R111	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R112	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R113	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R114	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R115	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R116	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R117	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R118	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R119	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R120	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R121	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R122	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R123	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R124	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R125	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R126	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R127	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R128	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R129	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R130	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R131	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R132	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R133	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R134	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R135	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R136	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R137	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R138	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R139	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R140	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R141	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R142	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R143	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R144	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R145	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R146	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R147	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R148	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R149	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R150	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R151	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R152	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R153	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R154	RN14BK2C2402F	RES. METAL FILM	24K	1%	1/6W
R155	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R156	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R157	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R158	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R159	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R160	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R161	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R162	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R163	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R164	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R165	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R166	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R167	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R168	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R169	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R170	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R171	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R172	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R173	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R174	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R175	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R176	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R177	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R178	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R179	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R180	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R181	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R182	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R183	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R185	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R186	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R187	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R188	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R189	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R190	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R191	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R192	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R193	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R194	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R195	RD14BB2C122J	RES. CARBON	1.2K	5%	1/6W
R196	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R197	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R198	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R199	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R200	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R201	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R202	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R203	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R204	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R205	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R206	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R207	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R208	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R209	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R210	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R211	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R212	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R213	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R214	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
R215	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R216	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R217	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R218	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R219	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R220	RN14BK2C6201F	RES. METAL FILM	6.2K	1%	1/6W
R221	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R222	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R223	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R224	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R225	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R226	RD14BB2C621J	RES. CARBON	620	5%	1/6W
R227	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R228	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R229	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R230	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R231	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R232	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R233	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R234	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R235	RN14BK2C1500F	RES. METAL FILM	150	1%	1/6W
R236	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R237	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R238	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R239	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R240	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R241	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R242	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R243	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R244	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R245	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R246	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R247	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R248	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R249	RD14BB2C911J	RES. CARBON	910	5%	1/6W
R250	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R251	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R252	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R253	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R254	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R255	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R256	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R257	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R258	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R259	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R260	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R261	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R262	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R263	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R264	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R265	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R266	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R267	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R268	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R269	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R270	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R271	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R272	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R273	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R274	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R275	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R276	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R277	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R278	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R279	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R280	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R281	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R282	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R283	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R284	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R285	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R286	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R287	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R288	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R289	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R290	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R291	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R292	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R293	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R294	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R295	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R296	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R297	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R298	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R299	RD14BB2C2R7J	RES. CARBON	2.7	5%	1/6W
R300	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R301	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R302	RN14BK2C9102F	RES. METAL FILM	91K	1%	1/6W
R303	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R304	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R305	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R306	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R307	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R308	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R309	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R310	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R311	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R312	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R313	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R314	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R315	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R316	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R317	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R318	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R319	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R320	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R321	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R322	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R323	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R324	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R325	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R326	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R327	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
TC001	C05-0309-05	CAP. TRIMMER	40P		
TC002	C05-0309-05	CAP. TRIMMER	40P		
TC003	C05-0062-05	CAP. TRIMMER	6P		
TC004	C05-0062-05	CAP. TRIMMER	6P		
TC005	C05-0031-15	CAP. TRIMMER	10P		
TC006	C05-0031-15	CAP. TRIMMER	10P		
TP001	E40-0211-05	PIN CONNECTOR	2 P		
VR002	R12-2512-05	RES. SEMI FIXED	5K B		
VR003	NO USE				
VR004	R12-2512-05	RES. SEMI FIXED	5K B		
VR005	R12-0539-05	RES. SEMI FIXED	200 B		
VR006	R12-2512-05	RES. SEMI FIXED	5K B		
VR007	R12-1517-05	RES. SEMI FIXED	1K B		
VR008	R12-1517-05	RES. SEMI FIXED	1K B		
VR009	R12-2512-05	RES. SEMI FIXED	5K B		
VR010	R12-2512-05	RES. SEMI FIXED	5K B		
VR011	R12-1518-05	RES. SEMI FIXED	2K B		
VR012	R12-1518-05	RES. SEMI FIXED	2K B		
VR013	R12-0421-05	RES. SEMI FIXED	100 B		
VR014	R12-0540-05	RES. SEMI FIXED	500 B		
VR015	NO USE				
VR016	R12-5516-05	RES. SEMI FIXED	100K B		
VR017	R12-0539-05	RES. SEMI FIXED	200 B		

HORIZONTAL OUTPUT AMP UNIT

X74-1360-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E23-0512-05	TERMINAL			
	F01-0849-05	HEAT SINK			
	J25-5039-22	PCB (UNMOUNTED)			
	J30-0605-05	SPACER			
	N30-3006-41	SCREW, PAN HD	M 3X6		
C001	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C003	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C004	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C006	CC45CH2H010C	CAP. CERAMIC	1P	0.25%	500V
C007	CC45CH2H010C	CAP. CERAMIC	1P	0.25%	500V
C008	CC45CH2H030C	CAP. CERAMIC	3P	0.25P	500V
C009	CC45CH2H010C	CAP. CERAMIC	1P	0.25%	500V
C010	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C011	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C012	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C013	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C014	C91-0549-05	CAP. TANTALUM	1	20%	35V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	C91-0549-05	CAP. TANTALUM	1	20%	35V
C017	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C018	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C019	CE04W1C101M	CAP. ELECTRO	100	20%	16V
C020	CE04W1C101M	CAP. ELECTRO	100	20%	16V
C021	CE04W2A100M	CAP. ELECTRO	10	20%	100V
C022	CE04W2C2R2	CAP. ELECTRO	2.2		160V
C023	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C024	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
C025	CE04W2C3R3	CAP. ELECTRO	3.3		160V
D001	1SS132	DIODE			
D002	MTZ5.1JB	DIODE ZENER	5V		
D003	1SS132	DIODE			
D004	1SS132	DIODE			
L001	L40-1011-04	FERRI INDUCTOR	100UH		
L002	L40-1011-04	FERRI INDUCTOR	100UH		
L003	L40-1011-04	FERRI INDUCTOR	100UH		
L004	L40-1011-04	FERRI INDUCTOR	100UH		
P027	E40-0873-05	PIN CONNECTOR	8 P		
P035	E40-0473-05	PIN CONNECTOR	4 P		
P036	E40-0673-05	PIN CONNECTOR	6 P		
Q001	2SA1323(B)	TR. SI, PNP			
Q002	2SA1323(B)	TR. SI, PNP			
Q003	2SA1323(B)	TR. SI, PNP			
Q004	2SA3311(R)	TR. SI, PNP			
Q005	2SC2912(S)	TR. SI, NPN			
Q006	2SC2912(S)	TR. SI, NPN			
Q007	2SA1210(S)	TR. SI, PNP			
Q008	2SA1210(S)	TR. SI, PNP			
Q009	2SA3311(R)	TR. SI, PNP			
Q010	2SA3311(R)	TR. SI, PNP			
Q011	2SA3311(R)	TR. SI, PNP			
R001	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R002	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R003	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R004	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R005	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R006	RD14BY2H473J	RES. CARBON	47K	5%	1/2W
R007	RD14BY2H473J	RES. CARBON	47K	5%	1/2W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R008	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R009	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R010	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R011	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R012	RS14GB3A223J	RES. METAL FILM	22K	5%	1W
R013	RS14GB3A223J	RES. METAL FILM	22K	5%	1W
R014	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R015	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R016	RD14BY2H123J	RES. CARBON	12K	5%	1/2W
R017	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R018	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R020	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R021	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R022	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R023	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R024	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R025	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R026	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R027	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W

A TRIG SWITCH UNIT

X77-1280-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J25-5039-22	PCB (UNMOUNTED)			
	L92-0110-05	BEAD CORE			
C001	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C002	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C004	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C005	CE04W1E100M	CAP. ELECTRO	10	20%	25V
C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C007	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
C008	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
C009	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C010	NO USE				
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C012	NO USE				
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C015	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C016	NO USE				
C017	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C018	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C019	CE04W1H010M	CAP. ELECTRO	1	20%	50V
C020	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C024	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C025	NO USE				
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C037	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C043	NO USE				
C044	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C045	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C046	NO USE				
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C048	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C049	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V
D001	SV03Y	DIODE			
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	MTZ16JA	DIODE ZENER	15V		
D005	1SS132	DIODE			
D006	1SS132	DIODE			
D007	1SS132	DIODE			
D008	1SS132	DIODE			
D009	SV04Y	DIODE			
L001	L40-1011-03	FERRI INDUCTOR	100MH		
L002	L40-1011-03	FERRI INDUCTOR	100MH		
P024	E40-0273-05	PIN CONNECTOR	2 P		
P046	E40-0273-05	PIN CONNECTOR	2 P		
P047	E40-0473-05	PIN CONNECTOR	4 P		
P059	E40-0973-05	PIN CONNECTOR	9 P		
Q001	2SJ43(Q)	FET. P-CHANNEL			
Q002	2SK127(Q)	FET.			
Q003	DN1901	FET. DUAL SI. N-CHANNEL			
Q004	2SC3354(T,S)	TR. SI. NPN			
Q005	2SC3354(T,S)	TR. SI. NPN			
Q006	2SA1161	TR. SI. PNP			
Q007	2SA1161	TR. SI. PNP			
Q008	2SA1309(Q,R)	TR. SI. PNP			
Q009	2SC3066	TR. SI. NPN			
Q010	2SC2671(H)	TR. SI. NPN			
Q011	2SC2671(H)	TR. SI. NPN			
Q012	2SC3354(T,S)	TR. SI. NPN			
Q013	2SC3354(T,S)	TR. SI. NPN			
Q014	2SC3354(T,S)	TR. SI. NPN			
Q015	2SC3354(T,S)	TR. SI. NPN			
Q016	2SC2671(H)	TR. SI. NPN			
Q017	2SC3311(R)	TR. SI. NPN			
Q018	2SA1309(Q,R)	TR. SI. PNP			
Q019	2SK30A(O)	FET.N-CHANNEL			
Q020	2SC3311(R)	TR. SI. NPN			
Q021	2SA1309(Q,R)	TR. SI. PNP			
Q022	2SC3311(R)	TR. SI. NPN			
Q023	2SA1309(Q,R)	TR. SI. PNP			
Q024	2SK30A(O)	FET.N-CHANNEL			
Q025	2SA1309(Q,R)	TR. SI. PNP			
R001	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R003	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R004	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R005	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R006	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R007	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R008	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R009	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R010	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R011	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R012	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R013	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R014	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R015	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R017	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R018	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
R019	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
R020	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R021	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R022	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R023	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R024	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R025	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R026	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R027	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R028	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R029	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R030	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R031	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R032	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R033	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R034	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R035	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R036	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R037	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R038	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R039	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R040	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R041	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R042	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R043	RD14BB2C161J	RES. CARBON	160	5%	1/6W
R044	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R045	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R048	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R049	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R051	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R052	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R053	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R054	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R055	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R056	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
R057	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R058	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R059	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R060	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R061	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R062	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R063	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R064	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R065	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R066	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
R067	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R068	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R069	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R070	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R071	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R072	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R073	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R074	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R075	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R076	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R077	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R078	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
S001	S33-2504-05	LEVER SWITCH			
S002	S32-4008-05	LEVER SWITCH			
TC001	C05-0412-05	CAP. TRIMMER	20P		
VR001	R01-5502-05	V.R.	100K B		
VR002	R12-3522-05	RES. SEMI FIXED	10K B		
VR003	R12-1519-05	RES. SEMI FIXED	1K B		
VR004	R12-1520-05	RES. SEMI FIXED	2K B		

B TRIG SWITCH UNIT

X77-1290-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J25-5023-14				
	J61-0506-05	BOARD SUPPORT			
	L92-0110-05	BEAD CORE			
C001	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C002	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C004	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C007	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C008	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C009	NO USE				
C010	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C012	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C017	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C018	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C019	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C020	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C025	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C037	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
D001	MTZ8.2JB	DIODE, ZENER	8.1V		
D002	SV03Y	DIODE			
D003	SV04Y	DIODE			
L001	L40-2201-03	FERRI INDUCTOR	22UH		
L002	L40-2201-03	FERRI INDUCTOR	22UH		
P043	E40-0273-05	PIN CONNECTOR	2 P		
P044	E40-0273-05	PIN CONNECTOR	2 P		
P045	E40-0473-05	PIN CONNECTOR	4 P		
P051	E40-0573-05	PIN CONNECTOR	5 P		
P058	E40-0273-05	PIN CONNECTOR	2 P		
Q001	2SC3354(T,S)	TR. SI, NPN			
Q002	DN1901	FET, DUAL SI, N-CHANNEL			
Q003	2SC3354(T,S)	TR. SI, NPN			
Q004	2SC3354(T,S)	TR. SI, NPN			
Q005	2SA1161	TR. SI, PNP			
Q006	2SA1161	TR. SI, PNP			
Q007	2SA1309(Q,R)	TR. SI, PNP			
Q008	2SC3066	TR. SI, NPN			
Q009	2SC2671(H)	TR. SI, NPN			
Q010	2SC2671(H)	TR. SI, NPN			
Q011	2SC3354(T,S)	TR. SI, NPN			
Q012	2SC3354(T,S)	TR. SI, NPN			
Q013	2SC3354(T,S)	TR. SI, NPN			
Q014	2SC3354(T,S)	TR. SI, NPN			
Q015	2SC2671(H)	TR. SI, NPN			
R001	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R003	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R004	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R005	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R006	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R007	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R008	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R009	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R010	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R011	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R012	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R013	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R014	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R015	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
R016	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R017	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R018	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R020	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R021	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R022	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R023	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R024	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R025	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R026	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R027	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R028	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R029	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R030	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R031	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R032	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R033	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R034	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R035	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R036	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R037	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R038	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R039	RD14BB2C161J	RES. CARBON	160	5%	1/6W
R040	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R041	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R043	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R044	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R045	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R048	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R049	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R051	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R052	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R053	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
S001	S37-2005-05	LEVER SWITCH			
S002	S37-2005-05	LEVER SWITCH			
TC001	C05-0412-05	CAP. TRIMMER	20P		
VR001	R01-5503-05	V.R.	100KB		
VR002	R12-3522-05	RES. SEMI FIXED	10K B		
VR003	R12-1520-05	RES. SEMI FIXED	2K B		

POWER BLANKING UNIT

X68-1400-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-0762-05	LEAD WIRE WITH CONNECTOR			
	E33-0965-00	WIRE ASSY			
	F02-0414-05	HEAT SINK			
	F02-0503-14	HEAT SINK			
	F09-0506-05	PROTECTION COVER			
	F15-0727-04	HOLDER (NEON TUBE)			
	F20-0516-05	INSULATOR			
	F20-0623-05	INSULATOR			
	J21-2930-14	BRACKET FOR VR			
	J30-0605-05	SPACER			
	N09-0167-05	SCREW			
	N09-0711-05	SCREW			
	Z12-1018-05	TUBE (PLASTIC)			
	Z12-3017-05	TUBE (PLASTIC)			
C001	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C003	CE04W1A101M	CAP. ELECTRO	100	20%	10V
C004	CE04W1J330M	CAP. ELECTRO	33	20%	63V
C005	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C006	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C007	CE04W1C330M	CAP. ELECTRO	33	20%	16V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
C008	C91-0549-05	CAP. TANTALUM	1	20%	35V
C009	CE04W1E101M	CAP. ELECTRO	100	20%	25V
C010	CE04W1E101M	CAP. ELECTRO	100	20%	25V
C011	CE04W1A221M	CAP. ELECTRO	220	20%	10V
C012	CE04W1V100M	CAP. ELECTRO	10	20%	35V
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	CE04W1V470M	CAP. ELECTRO	47	20%	35V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C017	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C018	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C019	CC45SL1H681J	CAP. CERAMIC	680P	5%	50V
C020	CC45SL1H681J	CAP. CERAMIC	680P	5%	50V
C023	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C024	CC45CH2H0R5C	CAP. CERAMIC	0.5P	0.25P	500V
C025	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C026	C91-0549-05	CAP. TANTALUM	1	20%	35V
C027	CC45CH2H030C	CAP. CERAMIC	3P	0.25P	500V
C028	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C031	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V
C032	CE04W1A221M	CAP. ELECTRO	220	20%	10V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CE04W1E101M	CAP. ELECTRO	100	20%	25V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C037	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C038	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C039	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C040	CK45E3F102P	CAP. CERAMIC	1000P		3.1K
C041	CQ93M1H154K	CAP. MYLAR	0.15	10%	50V
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C043	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C044	CE04W1E470M	CAP. ELECTRO	47	20%	25V
C045	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C046	CE04W1E470M	CAP. ELECTRO	47	20%	25V
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C048	CE04W1E470M	CAP. ELECTRO	47	20%	25V
C049	CQ93M1H472K	CAP. MYLAR	4700P	10%	50V
C050	CE04W1E470M	CAP. ELECTRO	47	20%	25V
C051	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C052	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C053	C91-0580-05	CAP. CERAMIC	0.01	0.25P	3KV
C054	CK45E3D102P	CAP. CERAMIC	1000P		2K
C055	CK45B2H222K	CAP. CERAMIC	2200P	10%	500V
C059	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C060	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C061	CE04W1C470M	CAP. ELECTRO	47	20%	16V
D001	1SS132	DIODE			
D002	MTZ12JC	DIODE, ZENER	12V		
D003	MTZ12JC	DIODE, ZENER	12V		
D004	MTZ3.3JA	DIODE, ZENER	3.2V		
D005	1SS132	DIODE			
D008	1SS132	DIODE			
D009	MTZ5.1JB	DIODE ZENER	5V		
D010	1SS83	DIODE			
D011	1SS83	DIODE			
D012	W06C	DIODE			
D013	W06C	DIODE			
D014	W06C	DIODE			
D015	W06C	DIODE			
D016	1SS132	DIODE			
D017	1SS132	DIODE			
D018	UZ-3.0B	DIODE,ZENER	3.0V		
D019	UZ-6.2BL	DIODE,ZENER	6.2V		
D020	1SS132	DIODE			
D021	1SS132	DIODE			
IC001	NJM4558D	IC			
IC002	NJM4558D	IC			
IC003	LM340LAZ5.0	IC,RUGULATOR			
L001	L40-1011-04	FERRI INDUCTOR	100UH		
L002	L40-1011-04	FERRI INDUCTOR	100UH		
L003	L40-1011-04	FERRI INDUCTOR	100UH		
L004	L40-1011-04	FERRI INDUCTOR	100UH		
L005	L40-1011-04	FERRI INDUCTOR	100UH		
L006	L40-1011-03	FERRI INDUCTOR	100MH		
L007	L40-1011-04	FERRI INDUCTOR	100UH		
L008	L40-1011-04	FERRI INDUCTOR	100UH		
NL001	NE-2B	NEON LAMP			
NL002	NE-2B	NEON LAMP			
NL003	NE-2B	NEON LAMP			
NL004	NE-2B	NEON LAMP			
P022	E40-0773-05	PIN CONNECTOR	7 P		
P023	E40-0473-05	PIN CONNECTOR	4 P		
P024	NO USE				
P025	E40-0273-05	PIN CONNECTOR	2 P		
P026	E40-0573-05	PIN CONNECTOR	5 P		
P027	E40-0873-05	PIN CONNECTOR	8 P		
P028	E40-0473-05	PIN CONNECTOR	4 P		
P029	E40-0703-05	PIN CONNECTOR	7 P		
P030	E40-0746-05	PIN CONNECTOR	7 P		
P031	NO USE				
P032	E40-0273-05	PIN CONNECTOR	2 P		
P033	E40-0332-05	PIN CONNECTOR	3 P		
P034	E40-0273-05	PIN CONNECTOR	2 P		
P063	E40-0673-05	PIN CONNECTOR	6 P		
PL001	B30-0927-15	LAMP			
PL002	B30-0927-15	LAMP			
PL003	B30-0927-15	LAMP			
PL004	B30-0927-15	LAMP			
Q001	2SC2591(Q,R)	TR. SI, NPN			
Q002	2SC1505(L)	TR. SI, NPN			
Q003	2SB633(E)	TR. SI, PNP			
Q004	2SD613(E)	TR. SI, NPN			
Q005	2SB633(E)	TR. SI, PNP			
Q006	2SC1505(L)	TR. SI, NPN			
Q007	2SC3311(R)	TR. SI, NPN			
Q008	2SC1505(L)	TR. SI, NPN			
Q009	2SC3311(R)	TR. SI, NPN			
Q010	2SA1309(Q,R)	TR. SI, PNP			
Q011	2SC3354(T,S)	TR. SI, NPN			
Q012	2SC3354(T,S)	TR. SI, NPN			
Q013	2SA1323(B)	TR. SI, PNP			
Q014	2SC3311(R)	TR. SI, NPN			
Q015	2SC3315(C,D)	TR. SI, NPN			
Q016	2SC3315(C,D)	TR. SI, NPN			
Q017	2SC3315(C,D)	TR. SI, NPN			
Q018	2SC2912(S)	TR. SI, NPN			
Q019	2SA1210(S)	TR. SI, PNP			
Q020	2SC2910(S,T)	TR. SI, NPN			
Q021	2SA1208(S,T)	TR. SI, PNP			
Q022	2SC2910(S,T)	TR. SI, NPN			
Q023	2SC2910(S,T)	TR. SI, NPN			
Q024	2SC3311(R)	TR. SI, NPN			
Q025	2SC3311(R)	TR. SI, NPN			
Q026	2SA1309(Q,R)	TR. SI, PNP			
Q027	2SK192A-BL	FET, N-CHANNEL			
Q028	2SD613(E)	TR. SI, NPN			
R001	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R002	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R003	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R004	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R005	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R006	RN14BK2C1303F	RES. METAL FILM	130K	1%	1/6W
R007	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R008	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R009	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R010	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R011	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R012	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R013	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R014	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R015	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R016	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R017	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R018	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R019	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R020	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R021	RD14BB2E100J	RES. CARBON	10	5%	1/4W
R022	RN14BK2C1302F	RES. METAL FILM	13K	1%	1/6W
R023	RN14BK2C8201F	RES. METAL FILM	8.2K	1%	1/6W
R024	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R025	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R026	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R027	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R028	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R029	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R030	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R031	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R032	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R033	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R034	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R035	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R036	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R037	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R038	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R039	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R040	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R041	RD14BB2E751J	RES. CARBON	750	5%	1/4W
R042	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R043	NO USE				
R044	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R045	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R046	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R047	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R048	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R049	RD14BB2C753J	RES. CARBON	75K	5%	1/6W
R050	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R051	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R052	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R053	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R054	RD14BB2C244J	RES. CARBON	240K	5%	1/6W
R055	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R056	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R057	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R058	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R059	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R060	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R061	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R062	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R063	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R064	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R065	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R066	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R067	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R068	RN14BK2C6202F	RES. METAL FILM	62K	1%	1/6W
R069	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R070	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R071	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R072	NO USE				
R073	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R074	R92-0793-05	RES. FIXED	15M	5%	1/2W
R075	R92-1119-05	RES. METAL GLAZE FILM			
R076	R92-0778-05	RES. FIXED	7.5M	5%	1W
R077	R92-1052-05	RES. FIXED	4.3M	5%	1W
R078	R92-0755-05	RES. FIXED	3M	5%	1/2W
R079	R92-0756-05	RES. FIXED	47M	5%	1/2W
R080	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R081	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R082	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R083	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R084	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R085	NO USE				
R086	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R087	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R088	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R091	RD14BB2C101J	RES. CARBON	100	5%	1/6W
TC001	C05-0405-05	CAP. TRIMMER	20P		
TC002	C05-0439-05	CAP. TRIMMER	40P		
TC003	C05-0438-05	CAP. TRIMMER	2P		
VR001	R12-1028-05	RES. SEMI FIXED	4.7K B		
VR002	R12-3041-05	RES. SEMI FIXED	10K B		
VR003	R12-3042-05	RES. SEMI FIXED	47K B		
VR004	R05-8001-05	V.R.	3M B		
VR005	R03-3502-15	V.R.	10K B		
VR006	R23-1501-05	V.R.	1K B		

FILTER UNIT

X70-1020-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E18-0351-05	INLET	3 P		
	E23-0503-05	TERMINAL			
	J25-5038-22	PCB (UNMOUNTED)			
C001	C91-0551-05	CAP. POLYESTER	0.22	10%	630V
C002	C91-0575-05	CAP. CERAMIC	1000P		630V
C003	C91-0575-05	CAP. CERAMIC	1000P		630V
C004	CE04W1H010M	CAP. ELECTRO	1	20%	50V
D001	1SS132	DIODE			
IC001	DN3101	PHOTO COUPLER			
L001	L33-0808-05	CHOKE COIL			
P024	E40-0273-05	PIN CONNECTOR	2 P		
R001	RD14BY2H224J	RES. CARBON	220K	5%	1/2W
R002	RC05GF2H225J	RES. SOLID	2.2M	5%	1/2W

ASTIG UNIT

X81-1430-00

REF.NO	PARTS NO	NAME & DESCRIPTION
	J25-5038-22	PCB (UNMOUNTED)
J063	E31-2467-15	LEAD WIRE WITH CONNECTOR
VR008	R12-3526-05	RES. SEMI FIXED 10K B
VR009	R12-5519-05	RES. SEMI FIXED 150K B

SWITCHING POWER SUPPLY

W02-0413-05

REF. NO	PARTS NO	NAME & DESCRIPTION			
D1	DBA20G	Diode			
D2	DFA01	Diode			
D3	DTA-10ER	Triac			
D4	DS442X	Diode			
D5	GFD10E	Diode			
D6	GFD10E	Diode			
D7	GFD10G	Diode			
D8	HZ3.6CP	Diode Zener			
D9	GZA6.2Z	Diode Zener			
Q1	2SC536KNP(F)	Transistor			
IC1	STK7308	IC			
IC2	STK732	IC			
L1	L19-0415-08	Line filter			
L2	L19-0414-08	Pulse Transformer			
L3	L33-0809-08	Coil	20μH		
L4	L33-0810-08	Coil	2.3μH		
L5	L33-0809-08	Coil	20μH		
L6	L40-4791-14	Ferri-inductor	4.7μH		
L7	L40-4791-14	Ferri-inductor	4.7μH		
L8	L40-4791-14	Ferri-inductor	4.7μH		
C1	C91-0599-08	Polyester cap	0.22μF		400V
C2	C91-0597-08	Ceramic cap	2200pF		250V
C3	C91-0597-08	Ceramic cap	2200pF		250V
C4	C91-0597-08	Ceramic cap	2200pF		250V
C5	C91-0597-08	Ceramic cap	2200pF		250V
C6	C90-0925-08	Electrolytic cap	100μF		400V
C7	C90-0926-08	Electrolytic cap	4.7μF		50V
C8	C90-0927-08	Electrolytic cap	10μF		50V
C9	C90-0928-08	Electrolytic cap	47μF		25V
C10	CK45B1H103K	Ceramic cap	0.01μF		50V
C11	C91-0598-08	Ceramic cap	0.001μF		1kV
C12	C90-0929-08	Electrolytic cap	470μF		16V
C13	C90-0930-08	Electrolytic cap	1000μF		10V
C14	C90-0929-08	Electrolytic cap	470μF		16V
C15	C90-0931-08	Electrolytic cap	220μF		35V
C16	C90-0932-08	Electrolytic cap	100μF		63V
C17	C90-0933-08	Electrolytic cap	22μF		160V
C18	C90-0934-08	Electrolytic cap	220μF		16V
C19	C90-0931-08	Electrolytic cap	220μF		35V
C20	C90-0935-08	Electrolytic cap	22μF		50V
C21	C90-0936-08	Electrolytic cap	10μF		100V
C22	C90-0933-08	Electrolytic cap.	22μF		160V
C23	C91-0600-08	Ceramic cap	0.01μF		630V
C24	C91-0598-08	Ceramic cap	0.001μF		1kV
C25	C91-0598-08	Ceramic cap	0.001μF		1kV
C26	C90-0937-08	Electrolytic cap	22μF		16V
R1	R92-1111-08	Widing res	10Ω		3W
R2	R92-1112-08	Widing res	2Ω		3W
R3	RD14BB2E910J	Carbon res	91Ω	±5%	1/4W
R4	R92-1113-08	Metal oxide res	220kΩ		1W
R5	RD14BB2E562J	Carbon res	5.6kΩ	±5%	1/4W
R6	RD14BB2E103J	Carbon res	10kΩ	±5%	1/4W
R7	R92-1114-08	Metal oxide res	33Ω		1W
R8	RD14BB2E102J	Carbon res	1kΩ	±5%	1/4W
R9	RD14BB2E100J	Carbon res	10Ω	±5%	1/4W
R12	RN14BK2E2201F	Metal film	2.2kΩ	±1%	1/4W
VR1	R12-3532-08	Semi-fixed res	10kΩ		
	E40-7011-08	Pin connector	3P		
	E40-7012-08	Pin connector	7P		
	F20-0643-08	Insulating sheet	(STK7308)		
	F20-0644-08	Insulating sheet	(STK732)		

VOLTAGES

The voltages are measured on each schematic diagram as follows;

TEST EQUIPMENT

Digital multimeter	: DL-720 (TRIO)
Oscilloscope	: 475A (TEKTRONIX)
Sine wave generator	: SG-502 (TEKTRONIX)

CONTROL SETTINGS

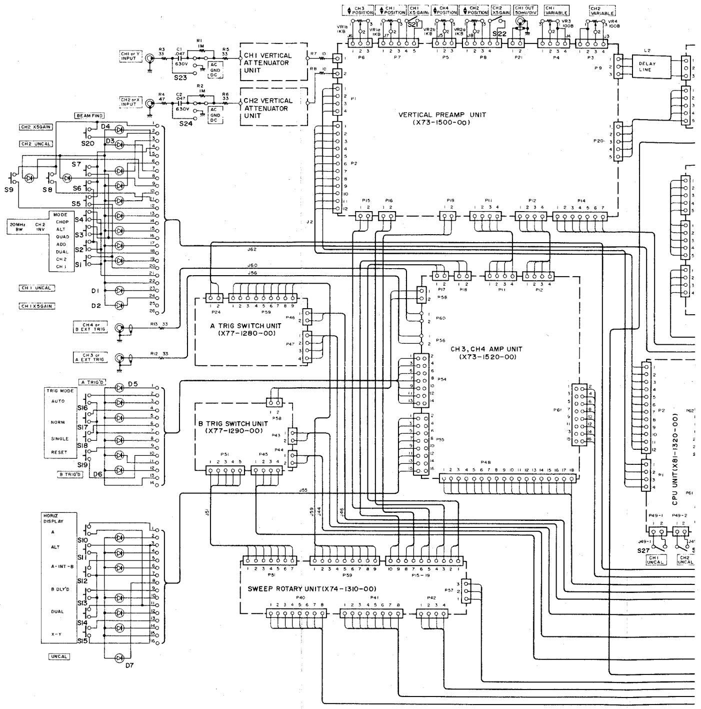
A INTENSITY	Midrange
FOCUS	Midrange
AC-GND-DC	GND for voltage measurement DC for waveform measurement
⬍ POSITION	Midrange
CH1, CH2 ×5 GAIN	OFF
CH1, CH2 VARIABLE	CAL
CH1, CH2 VOLTS/DIV	0.2 V
CH2 INV	OFF
V. MODE	Unless otherwise specified CH1
20 MHz BW	OFF
A, B COUPLING	AC
A, B SLOPE	+
TRIG. MODE	AUTO
HOLDOFF	NORM
A SWEEP TIME/DIV	0.2 ms
B SWEEP TIME/DIV	50 μs
A. VARIABLE	CAL
◄► POSITION	Midrange
HORIZ DISPLAY	A
X10 MAG	OFF

NOTE:
In differencial circuit, the voltages and waveforms are shown only CH1 and CH3.

Voltage Measurements

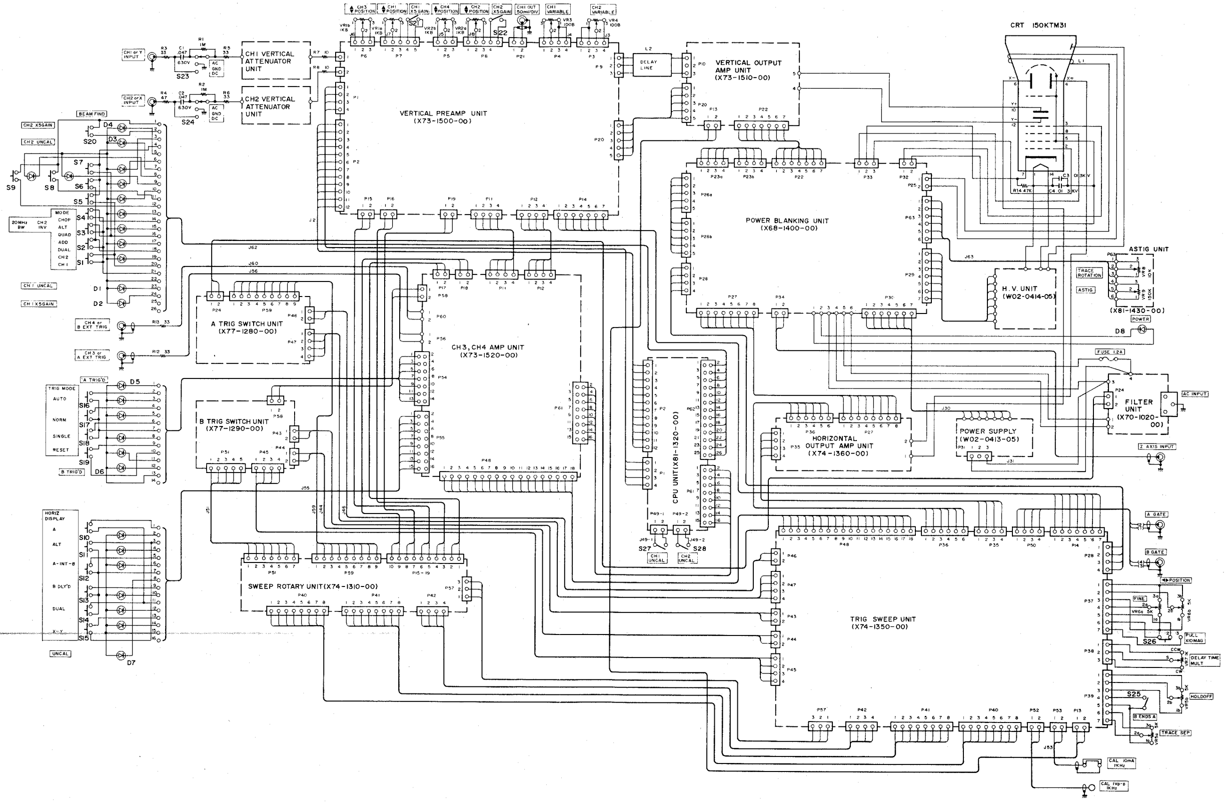
Voltage measurements are taken with no signal applied and the trace positioned to the center horizontal graticule line. The digital multimeter common should be connected to chassis ground at the nearest measurement point.

SCHEMATIC DIAGR


CH1 VERTICAL ATTENUATOR UNIT
CH2 VERTICAL ATTENUATOR UNIT
VERTICAL PREAMP UNIT (X73-1500-00)
DELAY LINE
A TRIG SWITCH UNIT (X77-1280-00)
CH3, CH4 AMP UNIT (X73-1520-00)
B TRIG SWITCH UNIT (X77-1290-00)
SWEEP ROTARY UNIT (X74-1310-00)
CPU UNIT (X81-1320-00)
CH1 or Y INPUT
CH2 or X INPUT
CH4 or B EXT TRIG
CH3 or A EXT TRIG
BEAM FIND
CH2 X5GAIN
CH2 UNCAL
CH1 UNCAL
CH1 X5GAIN
A TRIG'D
B TRIG'D
UNCAL
TRIG MODE
AUTO
NORM
SINGLE
RESET
HORIZ DISPLAY
A
ALT
A-INT-B
B DLY'D
DUAL
X-Y
MODE
CHOP
ALT
QUAD
ADD
DUAL
CH2
CH1
20MHz BW
CH2 INV
S23
S24
S27

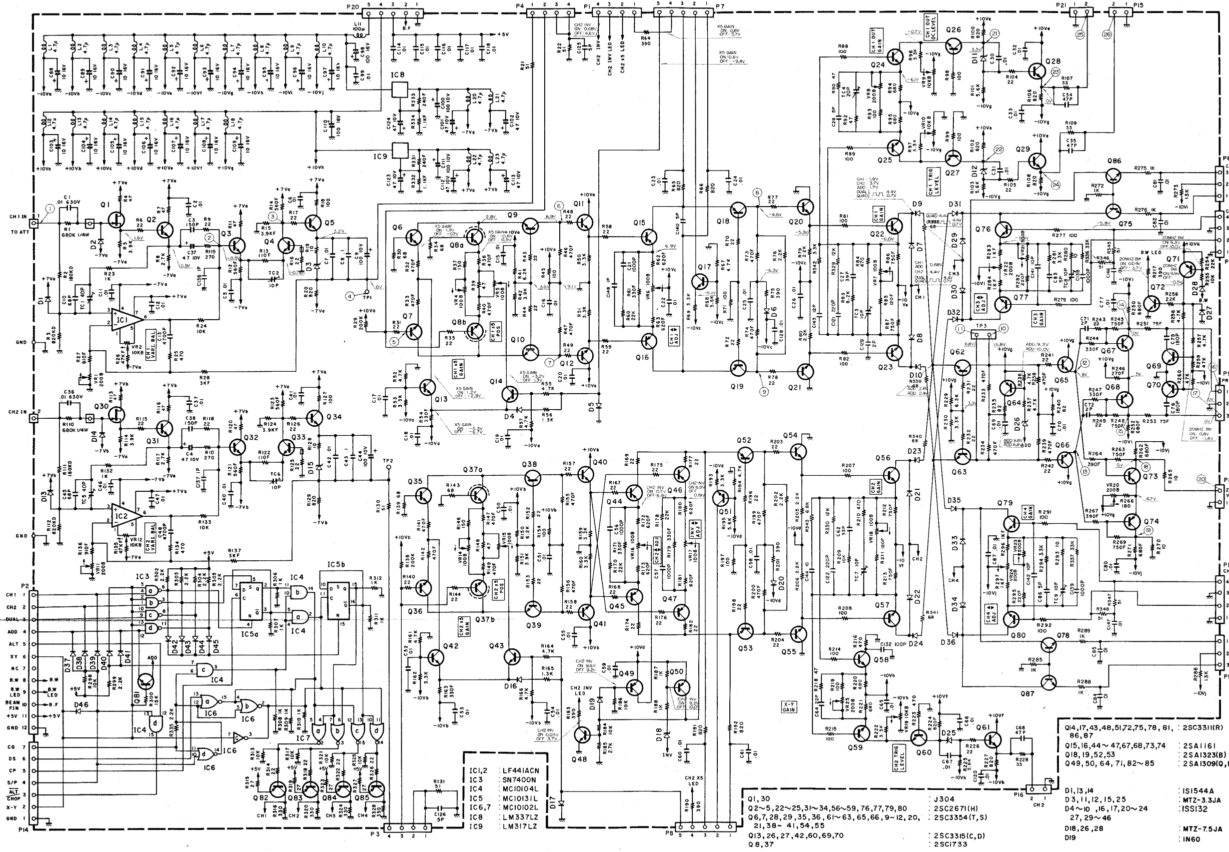
pplied and
ticule line.
nnected to
t.

SCHEMATIC DIAGRAM


CRT 150KTM31
CH1 or Y INPUT
CH2 or X INPUT
S23
S24
CH1 VERTICAL ATTENUATOR UNIT
CH2 VERTICAL ATTENUATOR UNIT
CH3 POSITION
CH1 POSITION
CH1 X5 GAIN
CH4 POSITION
CH2 POSITION
CH2 X5 GAIN
CH1 OUT 50mV/DIV
CH1 VARIABLE
CH2 VARIABLE
S21
S22
VERTICAL PREAMP UNIT (X73-1500-00)
DELAY LINE
L2
VERTICAL OUTPUT AMP UNIT (X73-1510-00)
POWER BLANKING UNIT (X68-1400-00)
ASTIG UNIT
TRACE ROTATION
ASTIG
(X81-1430-00)
POWER
D8
H.V. UNIT (W02-0414-05)
FUSE 1.2A
FILTER UNIT (X70-1020-00)
AC INPUT
POWER SUPPLY (W02-0413-05)
HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)
Z AXIS INPUT
CPU UNIT (X81-1320-00)
CH3, CH4 AMP UNIT (X73-1520-00)
A TRIG SWITCH UNIT (X77-1280-00)
B TRIG SWITCH UNIT (X77-1290-00)
SWEEP ROTARY UNIT (X74-1310-00)
TRIG SWEEP UNIT (X74-1350-00)
BEAM FIND
CH2 X5GAIN
CH2 UNCAL
CH1 UNCAL
CH1 X5GAIN
20MHz BW
CH2 INV
MODE
CHOP
ALT
QUAD
ADD
DUAL
CH2
CH1
S1
S2
S3
S4
S5
S6
S7
S8
S9
S20
D1
D2
D3
D4
CH4 or B EXT TRIG
CH3 or A EXT TRIG
A TRIG'D
D5
TRIG MODE
AUTO
NORM
SINGLE
RESET
S16
S17
S18
S19
B TRIG'D
D6
HORIZ DISPLAY
A
ALT
A-INT-B
B DLY'D
DUAL
X-Y
S10
S11
S12
S13
S14
S15
UNCAL
D7
S27
S28
CH1 UNCAL
CH2 UNCAL
A GATE
B GATE
POSITION
FINE
PULL X10MAG
S26
DELAY TIME MULT
HOLDOFF
S25
B ENDS A
TRACE SEP
CAL 10mA 1kHz
CAL 1Vp-p 1kHz

SCHEMATIC DIAGRAM

VERTICAL PREAMP UNIT (X73-1500-00)


P20
-10V
+10V
+5V
BEAM FIN
GND
P4
P1
P7
P21
CH1 OUT
CH1
P15
CH1 IN
TO ATT
CH2 IN
GND
P2
CH1
CH2
DUAL
ADD
ALT
XY
NC
B.W
B.W LED
BEAM FIN
+5V
GND
CQ
DS
CP
S/P
ALT CHOP
X-Y
GND
P14
P3
P8
P16
CH2
P6
CH3
CH3 IN
P11
P9
PRE OUT
P19
V. MODE
P12
CH4 IN
P5
IC1
IC2
IC3
IC4
IC5a
IC5b
IC6
IC7
IC8
IC9
TP1
TP2
TP3
CH1 VARI. BAL
CH2 VARI. BAL
CH1 x5 GAIN
CH2 x5 GAIN
CH1 x5 POS
CH2 x5 POS
CH1 ∞ ADJ
CH2 ∞ ADJ
INV ∞ ADJ
CH1 OUT GAIN
CH1 OUT DC LEVEL
CH1 TRIG LEVEL
CH1 GAIN
CH2 GAIN
CH3 ∞ ADJ
CH3 GAIN
CH4 GAIN
CH4 ∞ ADJ
X-Y GAIN
CH2 TRIG LEVEL
20MHz BW
B.W LED
CH2 INV LED
CH2 X5 LED

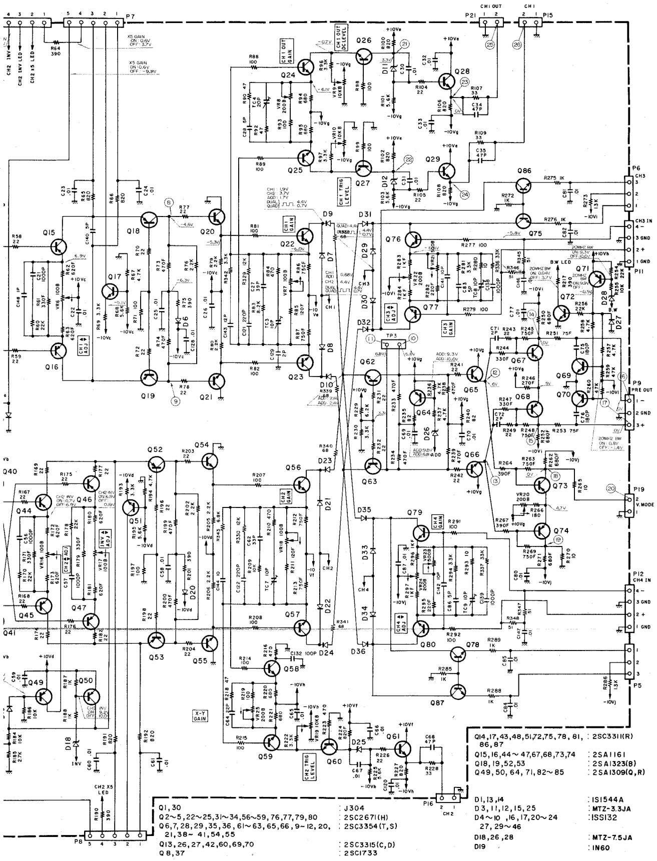
IC1,2	LF441ACN
IC3	SN7400N
IC4	MC10104L
IC5	MC10131L
IC6,7	MC10102L
IC8	LM337LZ
IC9	LM317LZ

Q1, 30	J304
Q2～5, 22～25, 31～34, 56～59, 76, 77, 79, 80	2SC2671(H)
Q6, 7, 28, 29, 35, 36, 61～63, 65, 66, 9～12, 20, 21, 38～41, 54, 55	2SC3354(T,S)
Q13, 26, 27, 42, 60, 69, 70	2SC3315(C,D)
Q8, 37	2SC1733

Q14, 17, 43, 48, 51, 72, 75, 78, 81, 86, 87	2SC3311(R)
Q15, 16, 44～47, 67, 68, 73, 74	2SA1161
Q18, 19, 52, 53	2SA1323(B)
Q49, 50, 64, 71, 82～85	2SA1309(Q,R)

D1, 13, 14	1S1544A
D3, 11, 12, 15, 25	MTZ-3.3JA
D4～10, 16, 17, 20～24, 27, 29～46	1SS132
D18, 26, 28	MTZ-7.5JA
D19	1N60

IATIC DIAGRAM

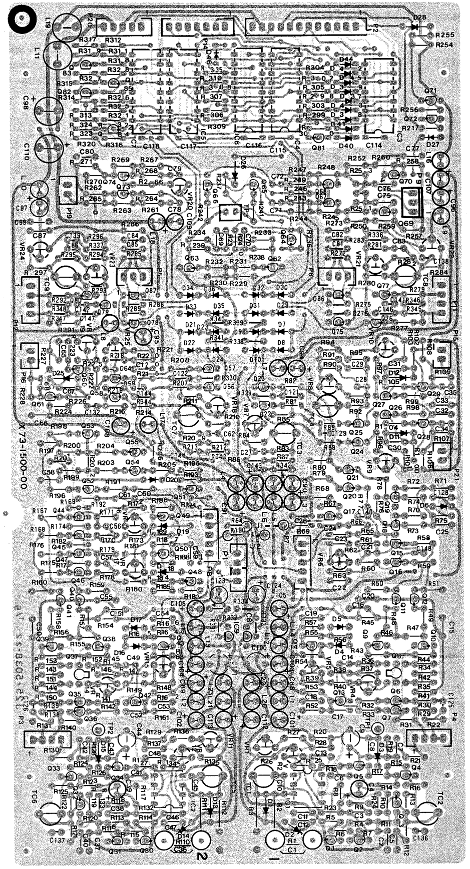

P7
X5 GAIN ON: 0.6V OFF: 3.7V
X5 GAIN ON: 0.6V OFF: -9.8V
CH2 INV
CH2 INV LED
CH2 x5 LED
CH1 OUT
CH1
P21
P15
CH1 OUT GAIN
CH1 OUT DC LEVEL
CH1 TRIG LEVEL
CH1 GAIN
CH1 ADJ
CH2 GAIN
CH3 ADJ
CH3 GAIN
CH4 GAIN
CH4 ADJ
CH2 TRIG LEVEL
X-Y GAIN
INV ADJ
TP3
P6
CH3
CH3 IN
P11
P9
PRE OUT
P19
V. MODE
P12
CH4 IN
P5
P16
CH2
P8
CH2 X5 LED
INV
B.W LED
20MHz BW ON: 0.04V OFF: 3.7V

Q14,17,43,48,51,72,75,78, 81, 86,87 : 2SC3311(R)
Q15,16,44～47,67,68,73,74 : 2SA1161
Q18,19,52,53 : 2SA1323(B)
Q49,50, 64, 71,82～85 : 2SA1309(Q,R)

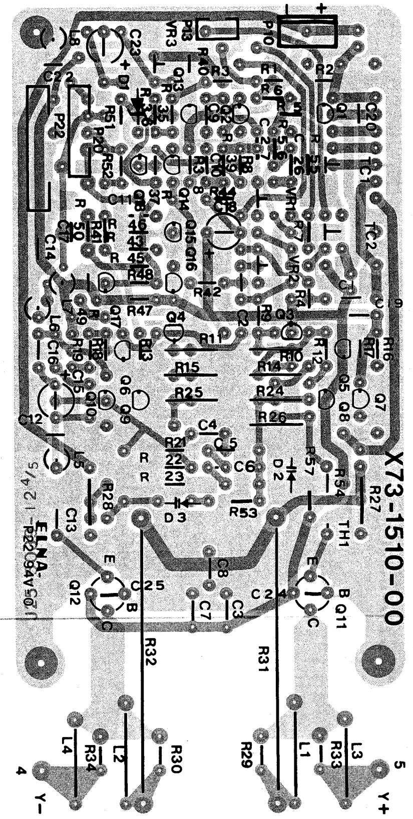
D1,13,14 : 1S1544A
D3,11,12,15,25 : MTZ-3.3JA
D4～10 ,16,17,20～24 27,29～46 : 1SS132
D18,26,28 : MTZ-7.5JA
D19 : 1N60

Q1,30 : J304
Q2～5,22～25,31～34,56～59,76,77,79,80 : 2SC2671(H)
Q6,7,28,29,35,36,61～63,65,66,9～12,20, 21,38～41,54,55 : 2SC3354(T,S)
Q13,26,27,42,60,69,70 : 2SC3315(C,D)
Q8,37 : 2SC1733

PC BOARD PREAMP UNIT (X73-1500-00)

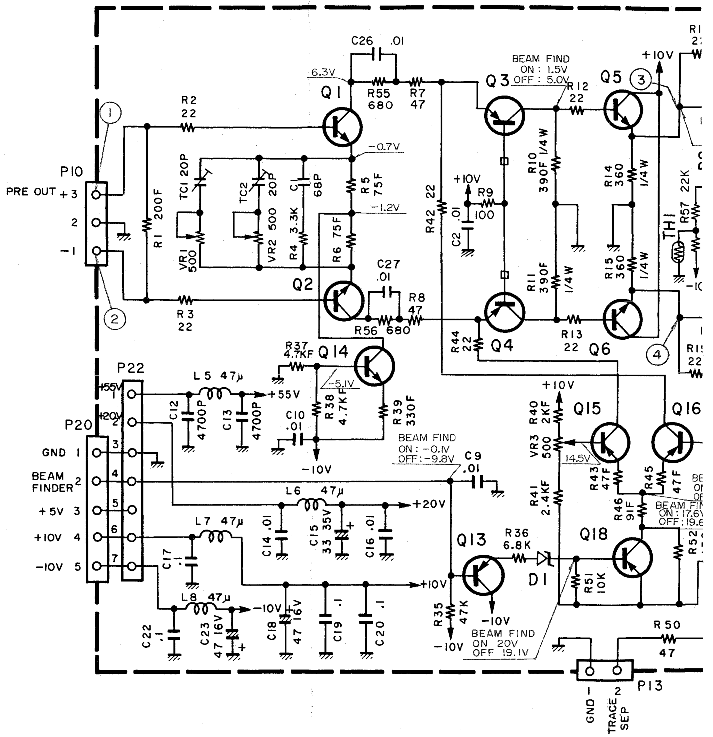

X73-1500-00
P1
P2
P3
P4
P5
P6
P11
P12
P16
P19
P21
TC1
TC2
TC3
TC6
TC7
TC8
TC9
VR1
VR7
VR20
VR21
VR24

PC BOARD VERTICAL OUTPUT AMP UNIT (X73-1510-00)


X73-1510-00
P10
P13
P20
P22
VR1
VR2
VR3
TC1
TC2
TH1
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
D1
D2
D3
R31
R32
L1
L2
L3
L4
R29
R30
R33
R34
C24
C25
E
B
C
4
5
Y–
Y+
ELNA

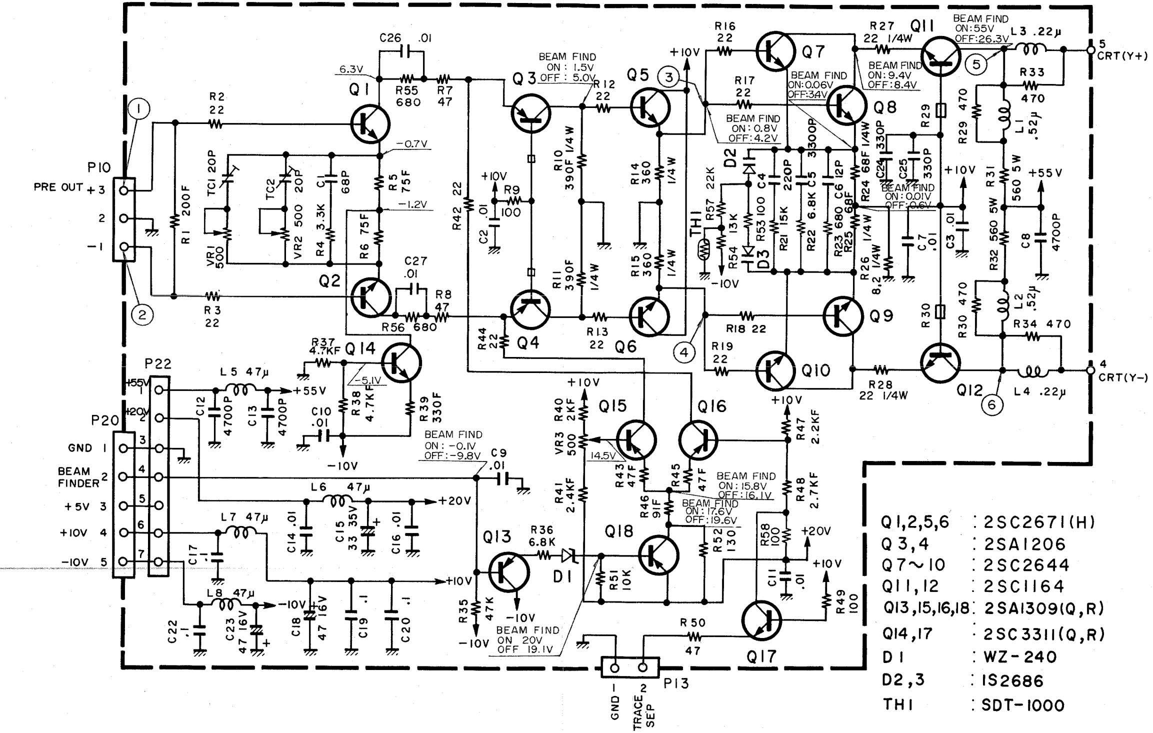
SCHEMATIC DIAGRAM

VERTICAL OUTPUT AMP UNIT (X73-1510-00)


PRE OUT
P10
+3
2
–1
P22
P20
GND 1
BEAM FINDER 2
+5V 3
+10V 4
–10V 5
R1 200F
R2 22
R3 22
TC1 20P
TC2 20P
VR1 500
VR2 500
R4 3.3K
C1 68P
C26 .01
6.3V
Q1
R55 680
R7 47
–0.7V
R5 75F
–1.2V
R6 75F
Q2
C27 .01
R8 47
R56 680
R37 4.7KF
Q14
R38 4.7KF
–5.1V
R39 330F
C10 .01
–10V
L5 47μ
+55V
C12 4700P
C13 4700P
L6 47μ
+20V
L7 47μ
C14 .01
C15 33 35V
C16 .01
C17 .1
L8 47μ
–10V
C22 .1
C23 47 16V
C18 47 16V
C19 .1
C20 .1
+10V
R42 22
C2 .01
+10V
R9 100
BEAM FIND
ON : 1.5V
OFF : 5.0V
Q3
Q4
R44 22
R10 390F 1/4W
R11 390F 1/4W
R12 22
R13 22
Q5
Q6
R14 360 1/4W
R15 360 1/4W
TH1
R57 22K
+10V
BEAM FIND
ON : –0.1V
OFF : –9.8V
C9 .01
+10V
R40 2KF
VR3 500
14.5V
R41 2.4KF
R43 47F
R45 47F
Q15
Q16
R46 91F
Q18
R52
Q13
R36 6.8K
D1
R51 10K
R35 47K
–10V
–10V
BEAM FIND
ON 20V
OFF 19.1V
R50 47
P13
GND 1
TRACE SEP 2
①
②
③
④

SCHEMATIC DIAGRAM

VERTICAL OUTPUT AMP UNIT (X73-1510-00)

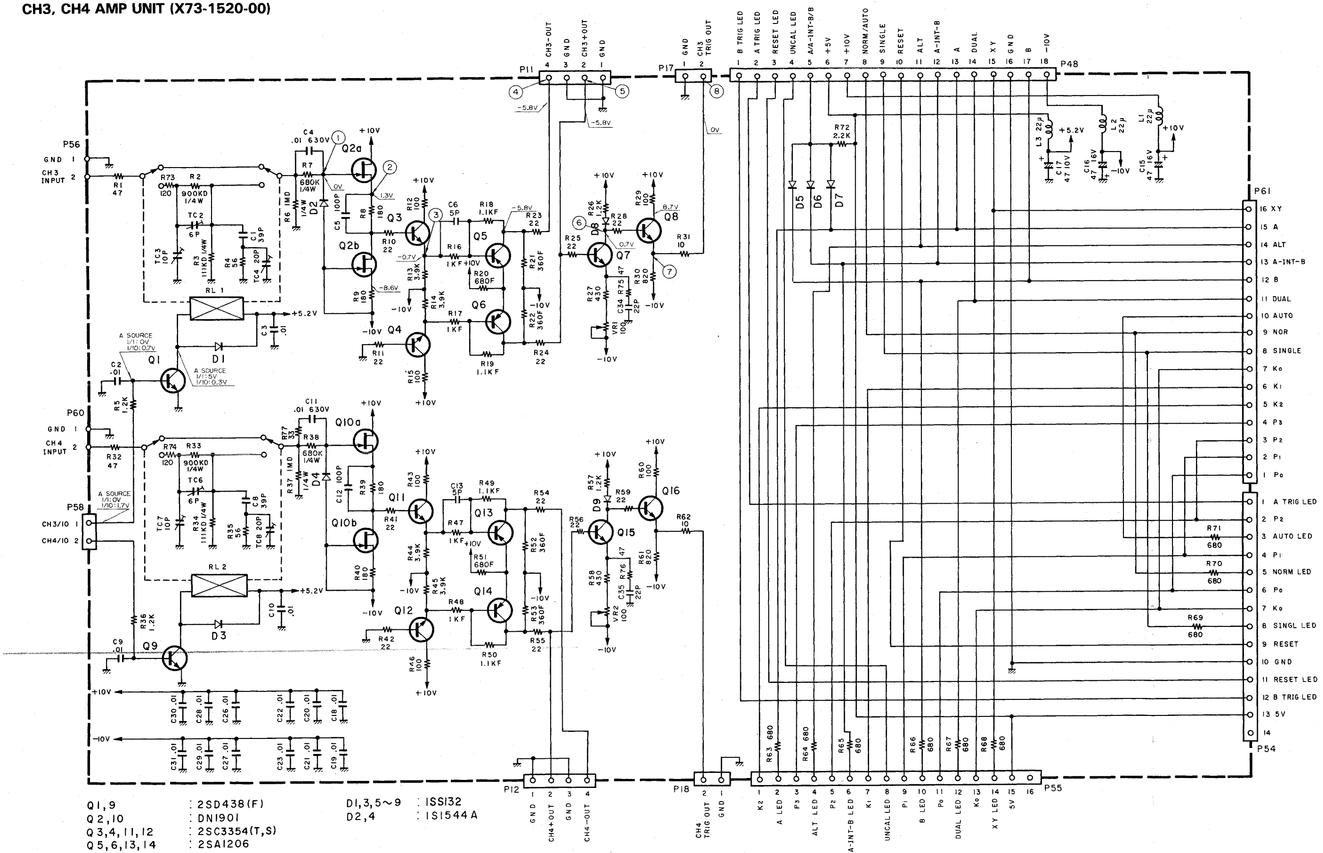


P10
PRE OUT +3
2
-1
①
②
R2 22
R1 200F
TC1 20P
TC2 20P
C1 68P
VR1 500
VR2 500
R4 3.3K
R3 22
Q1
Q2
C26 .01
6.3V
R55 680
R7 47
-0.7V
R5 75F
-1.2V
R6 75F
C27 .01
R8 47
R56 680
R42 22
R44 22
Q3
Q4
+10V
R9 100
C2 .01
BEAM FIND ON: 1.5V OFF: 5.0V
R12 22
R10 390F 1/4W
R11 390F 1/4W
R13 22
Q5
Q6
③
④
R14 360 1/4W
R15 360 1/4W
R16 22
Q7
R17 22
BEAM FIND ON:0.06V OFF:34V
BEAM FIND ON: 0.8V OFF: 4.2V
Q8
Q9
Q10
R18 22
R19 22
D2
D3
R57 22K
R54 13K
R53 100
TH1
-10V
C4 220P
C5 3300P
R21 15K
R22 6.8K
R23 680
C6 12P
R25 68F
R24 68F 1/4W
R26 8.2 1/4W
R27 22 1/4W
R28 22 1/4W
Q11
Q12
BEAM FIND ON: 9.4V OFF: 8.4V
BEAM FIND ON:55V OFF:26.3V
C24 330P
C25 330P
BEAM FIND ON: 0.01V OFF: 0.6V
C7 .01
C3 .01
R29 470
R30 470
R31 560 5W
R32 560 5W
+55V
C8 4700P
L1 .52μ
L2 .52μ
R33 470
R34 470
L3 .22μ
L4 .22μ
⑤
⑥
5 CRT(Y+)
4 CRT(Y-)
P22
P20
+55V 1
+20V 2
3
4
5
6
7
GND 1
BEAM FINDER 2
+5V 3
+10V 4
-10V 5
L5 47μ
+55V
C12 4700P
C13 4700P
R37 4.7KF
Q14
-5.1V
R38 4.7KF
R39 330F
C10 .01
-10V
BEAM FIND ON: -0.1V OFF: -9.8V
C9 .01
L6 47μ
+20V
C14 .01
C15 33 35V
C16 .01
L7 47μ
C17 .1
+10V
L8 47μ
-10V
C22 .1
C23 47 16V
C18 47 16V
C19 .1
C20 .1
Q13
R36 6.8K
D1
R35 47K
-10V
BEAM FIND ON 20V OFF 19.1V
+10V
R40 2KF
VR3 500
14.5V
R41 2.4KF
Q15
Q16
R43 47F
R45 47F
R46 91F
BEAM FIND ON: 15.8V OFF: 16.1V
BEAM FIND ON: 17.6V OFF: 19.6V
Q18
R51 10K
R52 130
R47 2.2KF
R48 2.7KF
R58 100
+20V
+10V
C11 .01
R49 100
R50 47
Q17
P13
GND 1
TRACE SEP 2

Q1,2,5,6	: 2SC2671(H)
Q3,4	: 2SA1206
Q7~10	: 2SC2644
Q11,12	: 2SC1164
Q13,15,16,18	: 2SA1309(Q,R)
Q14,17	: 2SC3311(Q,R)
D1	: WZ-240
D2,3	: 1S2686
TH1	: SDT-1000

SCHEMATIC DIAGRAM

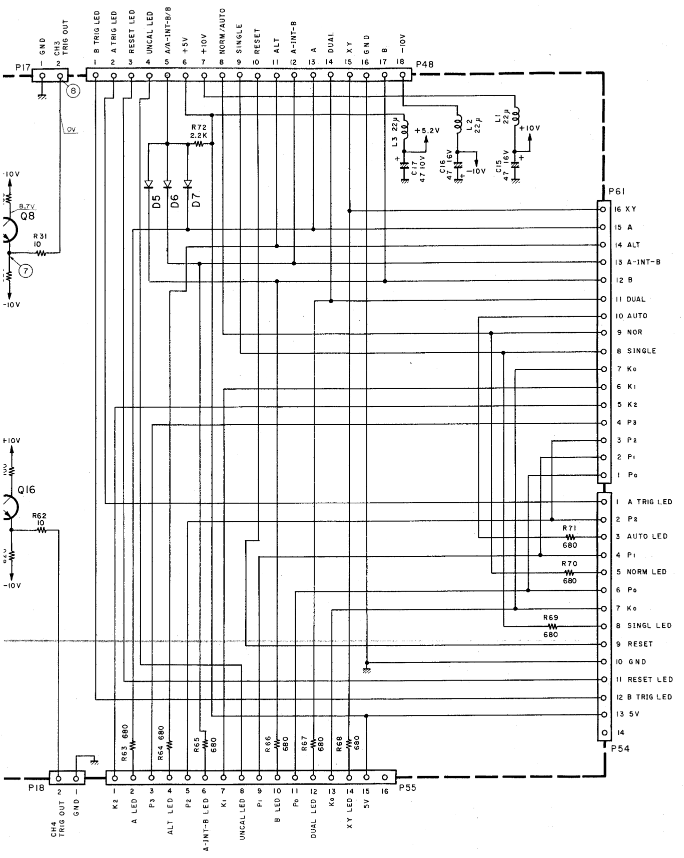
CH3, CH4 AMP UNIT (X73-1520-00)


P11
4 CH3-OUT
3 GND
2 CH3+OUT
1 GND
P17
1 GND
2 CH3 TRIG OUT
P48
1 B TRIG LED
2 A TRIG LED
3 RESET LED
4 UNCAL LED
5 A/A-INT-B/B
6 +5V
7 +10V
8 NORM/AUTO
9 SINGLE
10 RESET
11 ALT
12 A-INT-B
13 A
14 DUAL
15 XY
16 GND
17 B
18 -10V
P56
GND 1
CH3 INPUT 2
P60
GND 1
CH4 INPUT 2
P58
CH3/10 1
CH4/10 2
A SOURCE 1/1: 0V 1/10: 0.7V
A SOURCE 1/1: 5V 1/10: 0.3V
A SOURCE 1/1: 0V 1/10: 1.7V
Q1 Q2a Q2b Q3 Q4 Q5 Q6 Q7 Q8
Q9 Q10a Q10b Q11 Q12 Q13 Q14 Q15 Q16
D1 D2 D3 D4 D5 D6 D7 D8 D9
RL 1
RL 2
L1 22μ
L2 22μ
L3 22μ
+10V
-10V
+5.2V
-5.8V
1.3V
-0.7V
-8.6V
0.7V
8.7V
0V
P61
16 XY
15 A
14 ALT
13 A-INT-B
12 B
11 DUAL
10 AUTO
9 NOR
8 SINGLE
7 K0
6 K1
5 K2
4 P3
3 P2
2 P1
1 P0
P54
1 A TRIG LED
2 P2
3 AUTO LED
4 P1
5 NORM LED
6 P0
7 K0
8 SINGL LED
9 RESET
10 GND
11 RESET LED
12 B TRIG LED
13 5V
14
P12
1 GND
2 CH4+OUT
3 GND
4 CH4-OUT
P18
2 CH4 TRIG OUT
1 GND
P55
1 K2
2 A LED
3 P3
4 ALT LED
5 P2
6 A-INT-B LED
7 K1
8 UNCAL LED
9 P1
10 B LED
11 P0
12 DUAL LED
13 K0
14 XY LED
15 5V
16

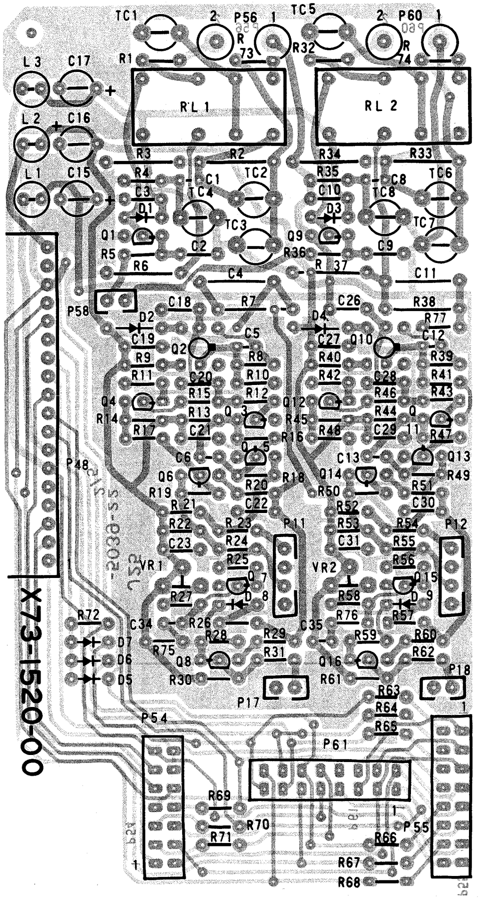
Q1,9 : 2SD438(F)
Q2,10 : DN1901
Q3,4,11,12 : 2SC3354(T,S)
Q5,6,13,14 : 2SA1206
Q7,8,15,16 : 2SC2671(H)

D1,3,5~9 : 1SS132
D2,4 : 1S1544A

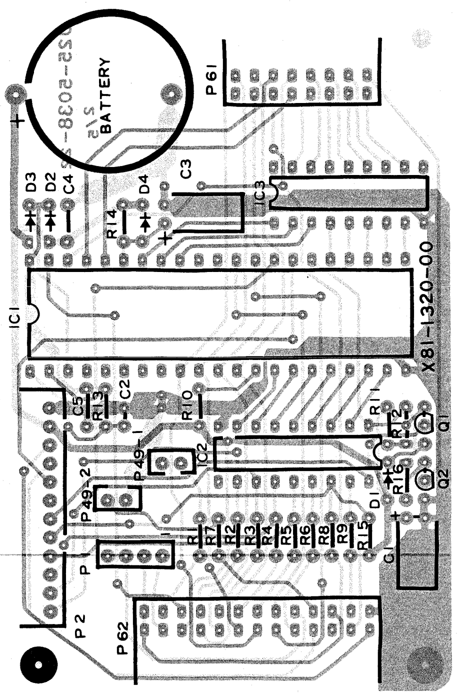
IATIC DIAGRAM


P17
1 GND
2 CH3 TRIG OUT
P48
1 B TRIG LED
2 A TRIG LED
3 RESET LED
4 UNCAL LED
5 A/A-INT-B/B
6 +5V
7 +10V
8 NORM/AUTO
9 SINGLE
10 RESET
11 ALT
12 A-INT-B
13 A
14 DUAL
15 XY
16 GND
17 B
18 -10V
R72 2.2K
D5
D6
D7
L3 22μ
+5.2V
C17 47 10V
L2 22μ
C16 47 16V
-10V
L1 22μ
+10V
C15 47 16V
Q8
R31 10
Q16
R62 10
8.7V
-10V
+10V
OV
P61
16 XY
15 A
14 ALT
13 A-INT-B
12 B
11 DUAL
10 AUTO
9 NOR
8 SINGLE
7 K0
6 K1
5 K2
4 P3
3 P2
2 P1
1 P0
P54
1 A TRIG LED
2 P2
3 AUTO LED
4 P1
5 NORM LED
6 P0
7 K0
8 SINGL LED
9 RESET
10 GND
11 RESET LED
12 B TRIG LED
13 5V
14
R71 680
R70 680
R69 680
R63 680
R64 680
R65 680
R66 680
R67 680
R68 680
P18
2 CH4 TRIG OUT
1 GND
P55
1 K2
2 A LED
3 P3
4 ALT LED
5 P2
6 A-INT-B LED
7 K1
8 UNCAL LED
9 P1
10 B LED
11 P0
12 DUAL LED
13 K0
14 XY LED
15 5V
16

PC BOARD CH3, CH4 AMP UNIT (X73-1520-00)

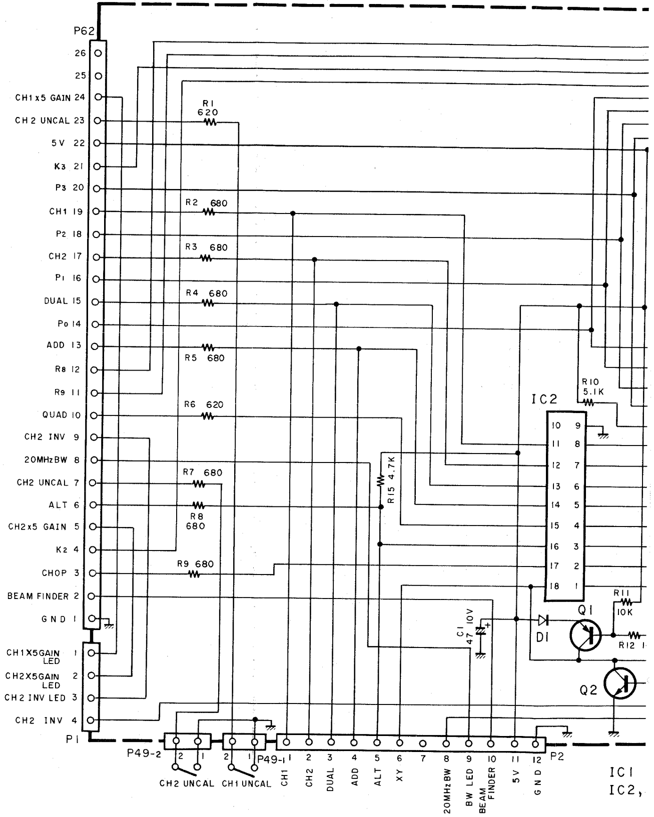

X73-1520-00
TC1
TC2
TC3
TC4
TC5
TC6
TC7
TC8
P56
P60
RL 1
RL 2
L1
L2
L3
C15
C16
C17
P58
P48
P11
P12
P17
P18
P54
P55
P61
VR1
VR2
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
D1
D2
D3
D4
D5
D6
D7
D8
D9

PC BOARD CPU UNIT (X81-1320-00)


BATTERY
P61
D3
D2
C4
D4
C3
R14
IC3
IC1
X81-1320-00
C5
R13
C2
R10
R11
R12
Q1
P49-1
IC2
P49-2
Q2
R16
D1
R1
R7
R2
R3
R4
R5
R6
R8
R9
R15
C1
P1
P2
P62

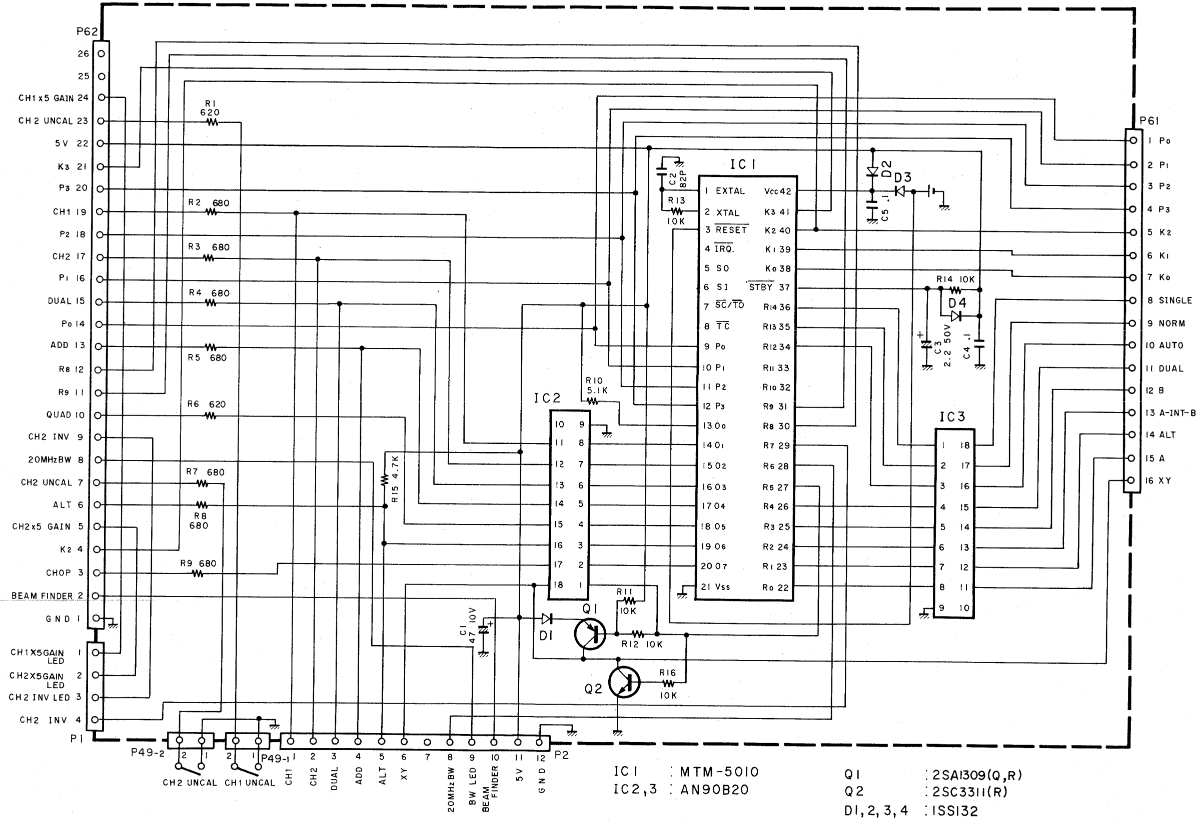
SCHEMATIC DIAGRAM

CPU UNIT (X81-1320-00)


P62
26
25
CH1x5 GAIN 24
CH2 UNCAL 23
5V 22
K3 21
P3 20
CH1 19
P2 18
CH2 17
P1 16
DUAL 15
P0 14
ADD 13
R8 12
R9 11
QUAD 10
CH2 INV 9
20MHzBW 8
CH2 UNCAL 7
ALT 6
CH2x5 GAIN 5
K2 4
CHOP 3
BEAM FINDER 2
GND 1
CH1X5GAIN LED 1
CH2X5GAIN LED 2
CH2 INV LED 3
CH2 INV 4
P1
R1 620
R2 680
R3 680
R4 680
R5 680
R6 620
R7 680
R8 680
R9 680
R15 4.7K
R10 5.1K
R11 10K
R12
IC2
C1 47 10V
D1
Q1
Q2
P49-2
P49-1
CH2 UNCAL
CH1 UNCAL
CH1
CH2
DUAL
ADD
ALT
XY
20MHzBW
BW LED
BEAM FINDER
5V
GND
P2
IC1
IC2,

SCHEMATIC DIAGRAM

CPU UNIT (X81-1320-00)

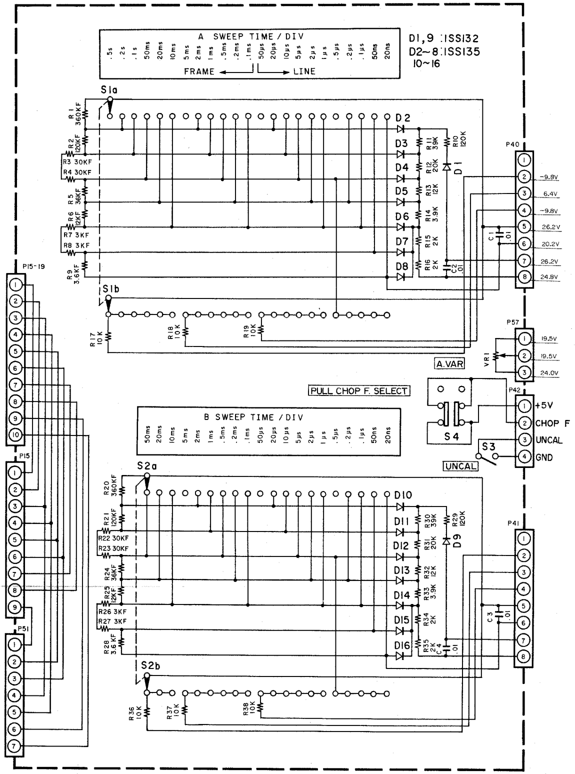

P62
26
25
CH1 x5 GAIN 24
CH 2 UNCAL 23
5V 22
K3 21
P3 20
CH1 19
P2 18
CH2 17
P1 16
DUAL 15
Po 14
ADD 13
R8 12
R9 11
QUAD 10
CH2 INV 9
20MHzBW 8
CH2 UNCAL 7
ALT 6
CH2x5 GAIN 5
K2 4
CHOP 3
BEAM FINDER 2
GND 1
CH1X5GAIN LED 1
CH2X5GAIN LED 2
CH2 INV LED 3
CH2 INV 4
P1
P49-2
P49-1
CH2 UNCAL
CH1 UNCAL
P2
1 CH1
2 CH2
3 DUAL
4 ADD
5 ALT
6 XY
7
8 20MHzBW
9 BW LED
10 BEAM FINDER
11 5V
12 GND
R1 620
R2 680
R3 680
R4 680
R5 680
R6 620
R7 680
R8 680
R9 680
R10 5.1K
R11 10K
R12 10K
R13 10K
R14 10K
R15 4.7K
R16 10K
C1 47 10V
C2 82P
C3 2.2 50V
C4 .1
C5 .1
D1
D2
D3
D4
Q1
Q2
IC1
1 EXTAL
2 XTAL
3 RESET
4 IRQ
5 SO
6 SI
7 SC/TO
8 TC
9 Po
10 P1
11 P2
12 P3
13 O0
14 O1
15 O2
16 O3
17 O4
18 O5
19 O6
20 O7
21 Vss
Vcc 42
K3 41
K2 40
K1 39
Ko 38
STBY 37
R14 36
R13 35
R12 34
R11 33
R10 32
R9 31
R8 30
R7 29
R6 28
R5 27
R4 26
R3 25
R2 24
R1 23
Ro 22
IC2
IC3
P61
1 Po
2 P1
3 P2
4 P3
5 K2
6 K1
7 Ko
8 SINGLE
9 NORM
10 AUTO
11 DUAL
12 B
13 A-INT-B
14 ALT
15 A
16 XY

IC1 : MTM-5010
IC2,3 : AN90B20

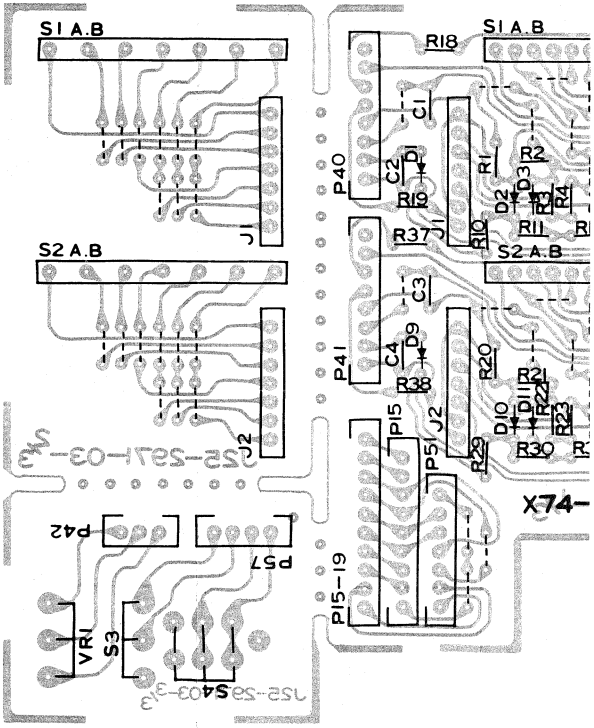
Q1 : 2SA1309(Q,R)
Q2 : 2SC3311(R)
D1,2,3,4 : 1SS132

SCHEMATIC DIAGRAM

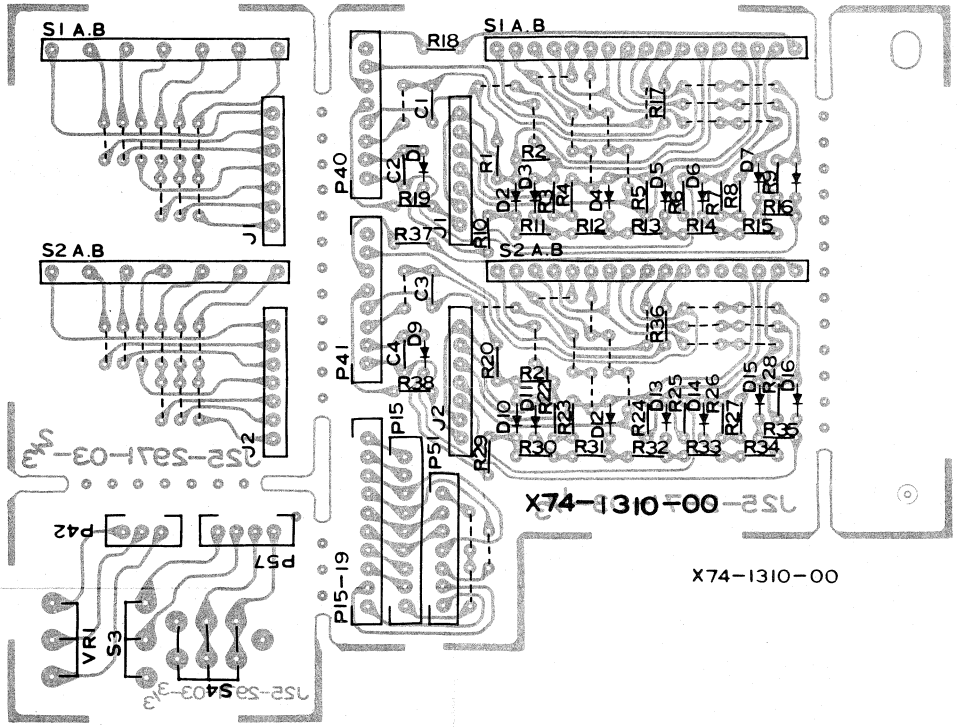
SWEEP ROTARY UNIT (X74-1310-00)


A SWEEP TIME / DIV
.5s .2s .1s 50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50μs 20μs 10μs 5μs 2μs 1μs .5μs .2μs .1μs 50ns 20ns
FRAME
LINE
D1,9 :1SS132
D2~8 :1SS135
10~16
S1a
S1b
R1 360KF
R2 120KF
R3 30KF
R4 30KF
R5 36KF
R6 12KF
R7 3KF
R8 3KF
R9 3.6KF
R10 120K
R11 39K
R12 20K
R13 12K
R14 3.9K
R15 2K
R16 2K
R17 10K
R18 10K
R19 10K
D1
D2
D3
D4
D5
D6
D7
D8
C1 .01
C2 .01
P40
-9.8V
6.4V
-9.8V
26.2V
20.2V
26.2V
24.8V
P57
19.5V
19.5V
24.0V
VR1
A.VAR
PULL CHOP F. SELECT
P42
+5V
CHOP F
UNCAL
GND
S4
S3
UNCAL
B SWEEP TIME / DIV
50ms 20ms 10ms 5ms 2ms 1ms .5ms .2ms .1ms 50μs 20μs 10μs 5μs 2μs 1μs .5μs .2μs .1μs 50ns 20ns
S2a
S2b
R20 360KF
R21 120KF
R22 30KF
R23 30KF
R24 36KF
R25 12KF
R26 3KF
R27 3KF
R28 3.6KF
R29 120K
R30 39K
R31 20K
R32 12K
R33 3.9K
R34 2K
R35 2K
R36 10K
R37 10K
R38 10K
C3 .01
C4 .01
D9
D10
D11
D12
D13
D14
D15
D16
P41
P15-19
P15
P51

PC BOARD SWEEP ROTARY UNIT (X74-1310-00)

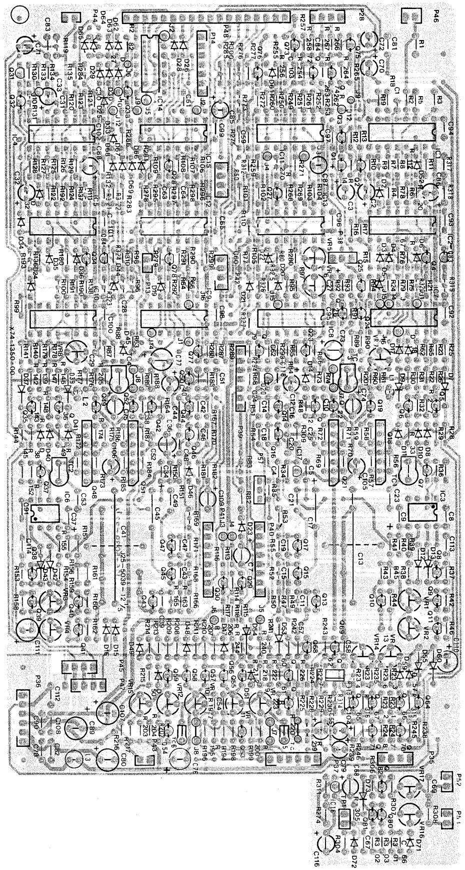

S1 A.B
S1 A.B
S2 A.B
S2 A.B
R18
C1
C2
D1
R1
R2
D2
D3
R3
R4
R19
R37
J1
R10
R11
P40
C3
C4
D9
R20
R21
R22
R23
D10
D11
R38
P41
J2
P15
P51
R29
R30
X74-
P15-19
P42
P57
VR1
S3
S4
J25-2971-03
J25-2903-3

PC BOARD SWEEP ROTARY UNIT (X74-1310-00)


S1 A.B
J1
S2 A.B
J2
P42
P57
VR1
S3
S4
P40
P41
P15-19
P15
P51
R18
C1
C2
D1
R19
R37
J1
R10
R1
R2
D2
D3
R3
R4
D4
R5
D5
R6
D6
R7
R8
D7
R9
R16
R11
R12
R13
R14
R15
R17
S2 A.B
C3
C4
D9
R38
J2
R20
R21
R22
D10
D11
R23
D12
R24
D13
R25
D14
R26
R27
D15
R28
D16
R35
R29
R30
R31
R32
R33
R34
R36
X74-1310-00

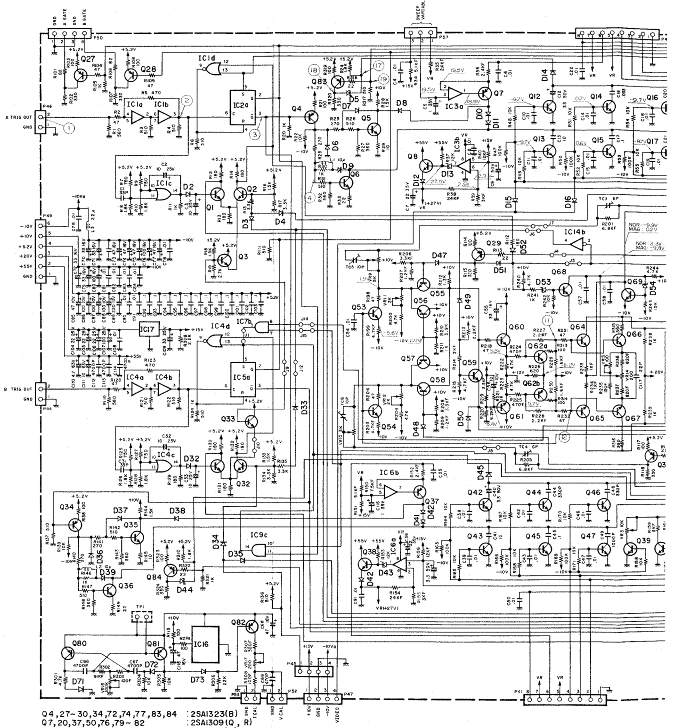
X74-1310-00

PC BOARD TRIG SWEEP UNIT (X74-1350-00)


X74-1350-00
P46
P28
P48
P14
P2
P44
P36
P41
P52
P47
P45
IC1
IC2
IC3
IC4
IC5
IC6
IC8
IC12
IC14
IC15
IC16
IC17
VR1
VR2
VR3
VR4
TP1
TP2

SCHEMATIC DIAG

TRIG SWEEP UNIT (X74-1350-00)


GND
A GATE
GND
B GATE
P50
SWEEP VARIABLE
P57
A TRIG OUT
GND
P46
B TRIG OUT
GND
P44
P49
-10V
+10V
+5.2V
+20V
+55V
GND
P53
GND
I CAL
P52
GND
V CAL
P47
+10V
GND
-10V
VIDEO
P45
P41
VR
IC1a
IC1b
IC1c
IC1d
IC2a
IC3a
IC3b
IC4a
IC4b
IC4c
IC4d
IC5a
IC6a
IC6b
IC7b
IC9c
IC14b
IC16
IC17
TP1
TP2

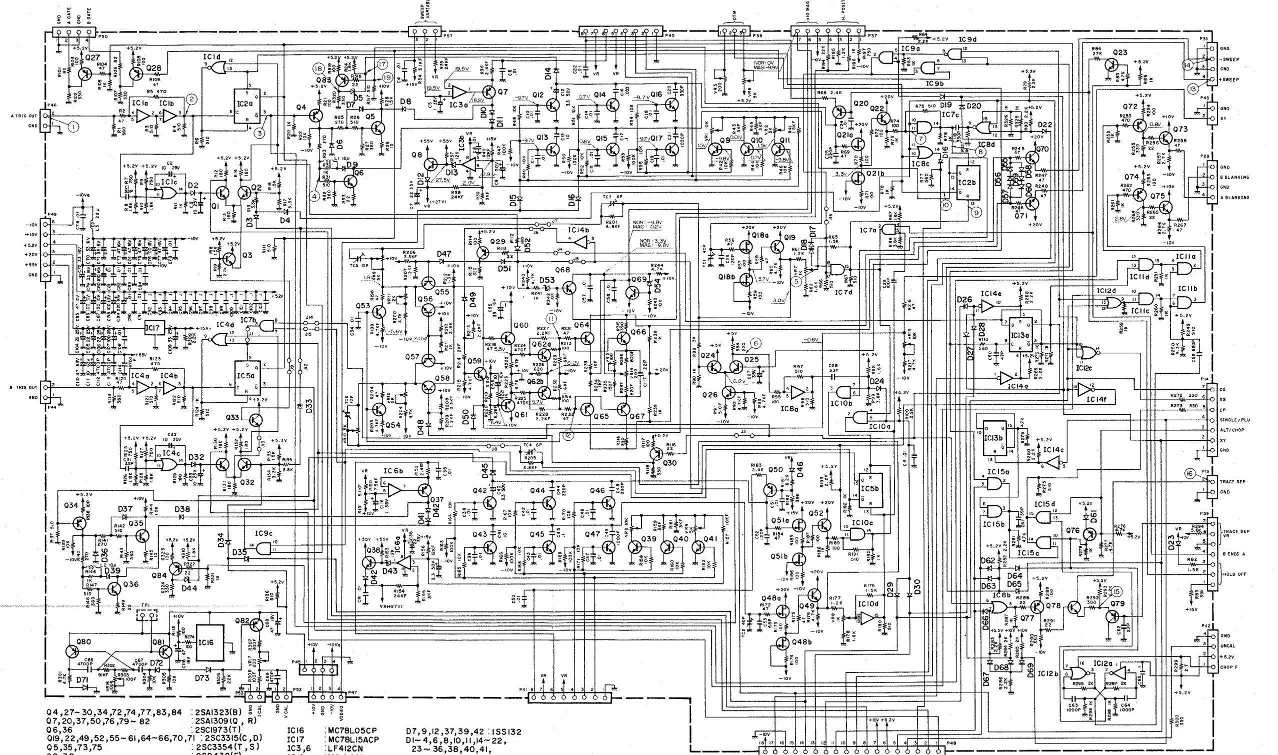
Q4,27~30,34,72,74,77,83,84 : 2SA1323(B)
Q7,20,37,50,76,79~82 : 2SA1309(Q, R)
Q6,36 : 2SC1973(T)
Q19,22,49,52,55~61,64~66,70,71 : 2SC3315(C,D)
Q5,35,73,75 : 2SC3354(T,S)
Q8,38 : 2SD438(F)
Q1~3,9~17,23~26,31~33,39~47 : 2SC3311(R)
53,54,68,69,78
Q18,21,48,51 : M47F(C)
Q62 : 2SA1239

IC16 : MC78L05CP
IC17 : MC78L15ACP
IC3,6 : LF412CN
IC12 : MC10102L
IC8 : MC10103L
IC7,9~11,15 : MC1014L
IC13 : MC10131L
IC14 : SN7405N
IC1,4 : MC10H103L
IC2,5 : MC10H131L

D7,9,12,37,39,42 : 1SS132
D1~4,6,8,10,11,14~22,
23~36,38,40,41,
45~52,56~59,
61~69,71,72
D5,44 : MTZ-3.0JB
D70 : MTZ-10JC
D53,54 : MTZ-12JC
D13,43 : MTZ-15JC
D55,60 : SV06Y
D73 : 1N60

SCHEMATIC DIAGRAM

TRIG SWEEP UNIT (X74-1350-00)


P50
P57
P40
P38
P37
P35
P46
P49
P44
P43
P28
P14
P13
P39
P42
P45
P53
P52
P47
P41
P48
SWEEP VARIABLE
DTM
10 MAG
H. POSITION
A TRIG OUT
B TRIG OUT
GND
A GATE
B GATE
-SWEEP
+SWEEP
XY
B BLANKING
A BLANKING
CQ
DS
CP
SINGLE/PLU
ALT/CHOP
TRACE SEP
B ENDS A
HOLD OFF
UNCAL
CHOP F
I CAL
V CAL
VIDEO
NOR: 0V
MAG: -9.9V
IC1a
IC1b
IC1c
IC1d
IC2a
IC2b
IC3a
IC3b
IC4a
IC4b
IC4c
IC4d
IC5a
IC5b
IC6a
IC6b
IC7a
IC7b
IC7c
IC7d
IC8a
IC8b
IC8c
IC8d
IC9a
IC9b
IC9c
IC9d
IC10a
IC10b
IC10c
IC10d
IC11a
IC11b
IC11c
IC11d
IC12a
IC12b
IC12c
IC12d
IC13a
IC13b
IC14a
IC14b
IC14c
IC14e
IC14f
IC15a
IC15b
IC15c
IC15d
IC16
IC17
TP1

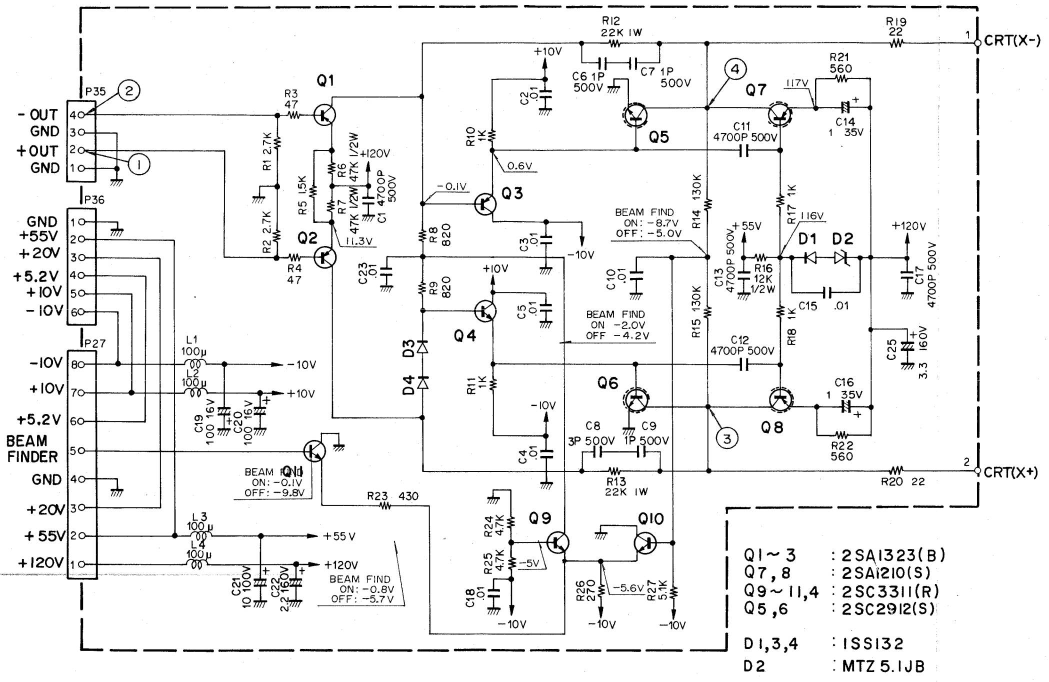
Q4,27~30,34,72,74,77,83,84	:2SA1323(B)
Q7,20,37,50,76,79~82	:2SA1309(Q , R)
Q6,36	:2SC1973(T)
Q19,22,49,52,55~61,64~66,70,71	:2SC3315(C,D)
Q5,35,73,75	:2SC3354(T,S)
Q8,38	:2SD438(F)
Q1~3,9~17,23~26,31~33,39~47 53,54,68,69,78	:2SC3311(R)
Q18,21,48,51	:M47F(C)
Q62	:2SA1239

IC16	:MC78L05CP
IC17	:MC78L15ACP
IC3,6	:LF412CN
IC12	:MC10102L
IC8	:MC10103L
IC7,9~11,15	:MC1014L
IC13	:MC10131L
IC14	:SN7405N
IC1,4	:MC10H103L
IC2,5	:MC10H131L

D7,9,12,37,39,42	:1SS132
D1~4,6,8,10,11,14~22, 23~36,38,40,41, 45~52,56~59, 61~69,71,72	
D5,44	:MTZ-3.0JB
D70	:MTZ-10JC
D53,54	:MTZ-12JC
D13,43	:MTZ-15JC
D55,60	:SV06Y
D73	:1N60

SCHEMATIC DIAGRAM

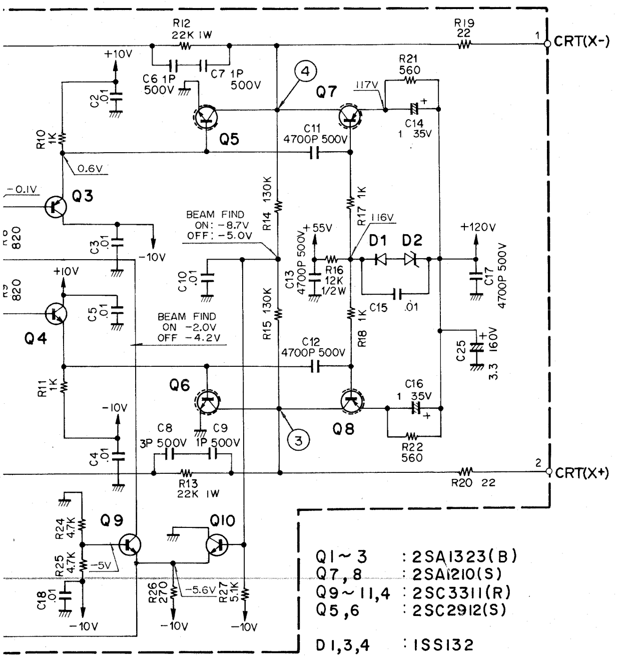
HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)


P35
② ①
- OUT 4
GND 3
+ OUT 2
GND 1
P36
GND 1
+55V 2
+20V 3
+5.2V 4
+10V 5
- 10V 6
P27
-10V 8
+10V 7
+5.2V 6
BEAM FINDER 5
GND 4
+20V 3
+55V 2
+120V 1
L1 100μ
L2 100μ
L3 100μ
L4 100μ
C19 100 16V
C20 100 16V
C21 10 100V
C22 2.2 160V
-10V
+10V
+55 V
+120V
BEAM FIND ON: -0.8V OFF: -5.7V
Q11
BEAM FIND ON: -0.1V OFF: -9.8V
R23 430
Q1
Q2
R3 47
R4 47
R1 2.7K
R2 2.7K
R5 1.5K
R6 47K 1/2W
R7 47K 1/2W
C1 4700P 500V
+120V
11.3V
C23 .01
-0.1V
R8 820
R9 820
D3
D4
Q3
Q4
R10 1K
0.6V
R11 1K
C2 .01
C3 .01
C4 .01
C5 .01
+10V
-10V
R12 22K 1W
C6 1P 500V
C7 1P 500V
Q5
Q6
C8 3P 500V
C9 1P 500V
R13 22K 1W
④
③
BEAM FIND ON: -8.7V OFF: -5.0V
BEAM FIND ON -2.0V OFF -4.2V
C10 .01
R14 130K
R15 130K
C11 4700P 500V
C12 4700P 500V
C13 4700P 500V
+55V
R16 12K 1/2W
R17 1K
R18 1K
116V
117V
Q7
Q8
R21 560
R22 560
C14 1 35V
C16 1 35V
D1 D2
C15 .01
+120V
C17 4700P 500V
C25 3.3 160V
R19 22
R20 22
1 CRT(X-)
2 CRT(X+)
Q9
Q10
R24 4.7K
R25 4.7K
-5V
C18 .01
R26 270
-5.6V
R27 5.1K
-10V

Q1 ~ 3 : 2SA1323(B)
Q7 , 8 : 2SA1210(S)
Q9 ~ 11,4 : 2SC3311(R)
Q5 ,6 : 2SC2912(S)

D1,3,4 : 1SS132
D2 : MTZ 5.1JB

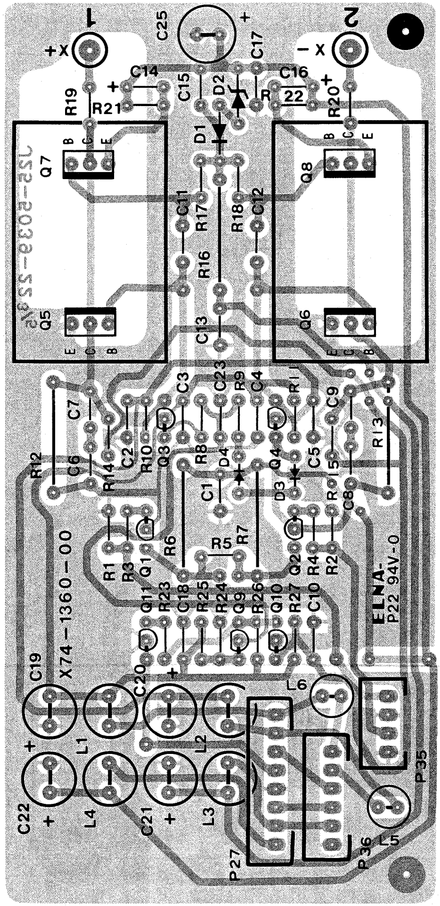
ATIC DIAGRAM


R12
22K 1W
+10V
C6 1P
500V
C7 1P
500V
R19
22
1
CRT(X-)
C2
.01
R10
1K
Q5
④
Q7
117V
R21
560
C14
1 35V
C11
4700P 500V
0.6V
-0.1V
Q3
R14 130K
R17 1K
BEAM FIND
ON: -8.7V
OFF: -5.0V
+55V
116V
D1
D2
+120V
C3
.01
-10V
C10
.01
C13
4700P 500V
R16
12K
1/2W
C17
4700P 500V
820
+10V
C5
.01
C15
.01
Q4
BEAM FIND
ON -2.0V
OFF -4.2V
R15 130K
R18 1K
C12
4700P 500V
C25
3.3 160V
R11
1K
Q6
C16
1 35V
-10V
Q8
③
C8
3P 500V
C9
1P 500V
R22
560
C4
.01
R13
22K 1W
R20 22
2
CRT(X+)
R24
4.7K
Q9
Q10
R25
4.7K
-5V
R26
270
-5.6V
R27
5.1K
C18
.01
-10V
-10V
-10V

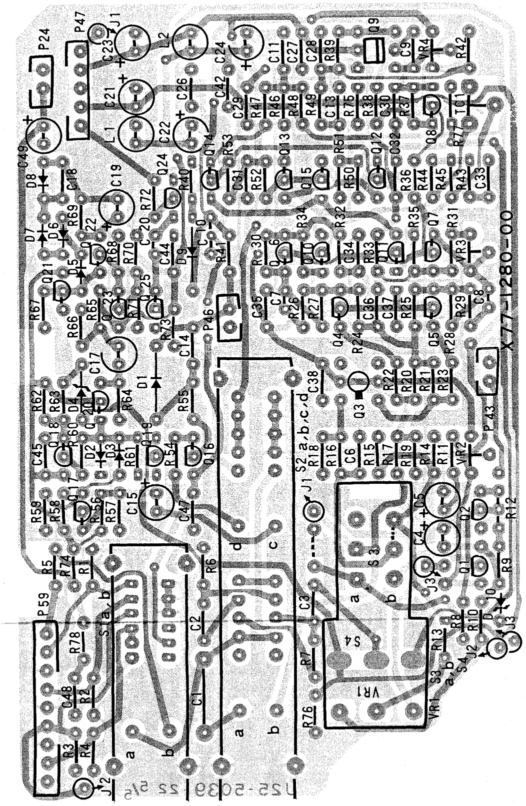
Q1～3 : 2SA1323(B)
Q7,8 : 2SA1210(S)
Q9～11,4 : 2SC3311(R)
Q5,6 : 2SC2912(S)

D1,3,4 : 1SS132
D2 : MTZ 5.1JB

PC BOARD HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)

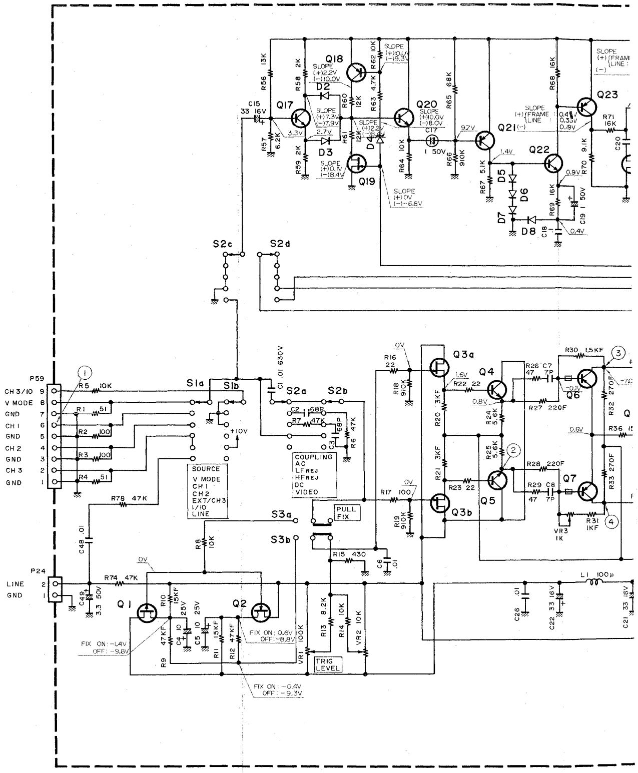

1
+X
C25
C17
2
-X
C14
C15
D2
C16
R19
R21
R
22
R20
D1
Q7
Q8
C11
R17
R18
C12
R16
Q5
C13
Q6
C7
C3
C23
R9
C4
R1
C9
R12
C6
R14
C2
R10
Q3
R8
D4
Q4
C5
R15
R13
C1
D3
R
C8
R6
R5
R7
R1
R3
Q1
Q2
R4
R2
X74-1360-00
Q11
R23
C18
R25
R24
Q9
R26
Q10
R27
C10
ELNA
P22 94V-0
C19
C20
L6
L1
L2
P35
C22
L4
C21
L3
P27
P36
L5

PC BOARD A TRIG SWITCH UNIT (X77-1280-00)


P24
P47
J1
C23
C21
L1
C22
C26
C24
C42
C11
C27
C28
R39
Q9
C9
VR4
R42
C49
D8
C18
C19
Q24
R72
R40
Q14
R53
R47
R46
R48
R49
C13
R75
R38
C30
R37
Q8
TC1
Q13
R51
Q12
C32
R77
C31
R52
Q15
R50
R36
R44
R45
R43
C33
D7
D6
R69
C20
C44
D9
C10
R41
R34
R32
R35
Q7
R31
VR3
Q21
D5
R68
R70
Q25
R30
Q6
Q10
C34
R33
Q11
R67
R66
R65
C23
R71
R73
P46
C35
C7
R26
R27
C36
C37
R25
R29
C8
C17
C14
Q4
R24
Q5
R28
X77-1280-00
R62
R63
D4
Q20
R64
D1
R55
C38
Q3
R22
R20
R21
R23
P43
C45
Q18
R60
D2
D3
R61
Q19
R54
Q16
S2 a.b.c.d
R18
R16
C6
R15
R17
R19
R14
R11
VR2
R59
R58
Q17
R56
R57
C15
C47
J1
S3
C5
C4
Q2
R12
d
c
Q1
R9
R5
R74
R1
R6
J3
P59
S1 a.b
C3
a
b
D
R13
R8
R10
J3
C2
R78
S4
J2
C48
R2
R7
VR1
S3 a.b
S4
C1
R76
VR1
R3
R4
J2
a
b
a
b
J25-5039 22 5/5

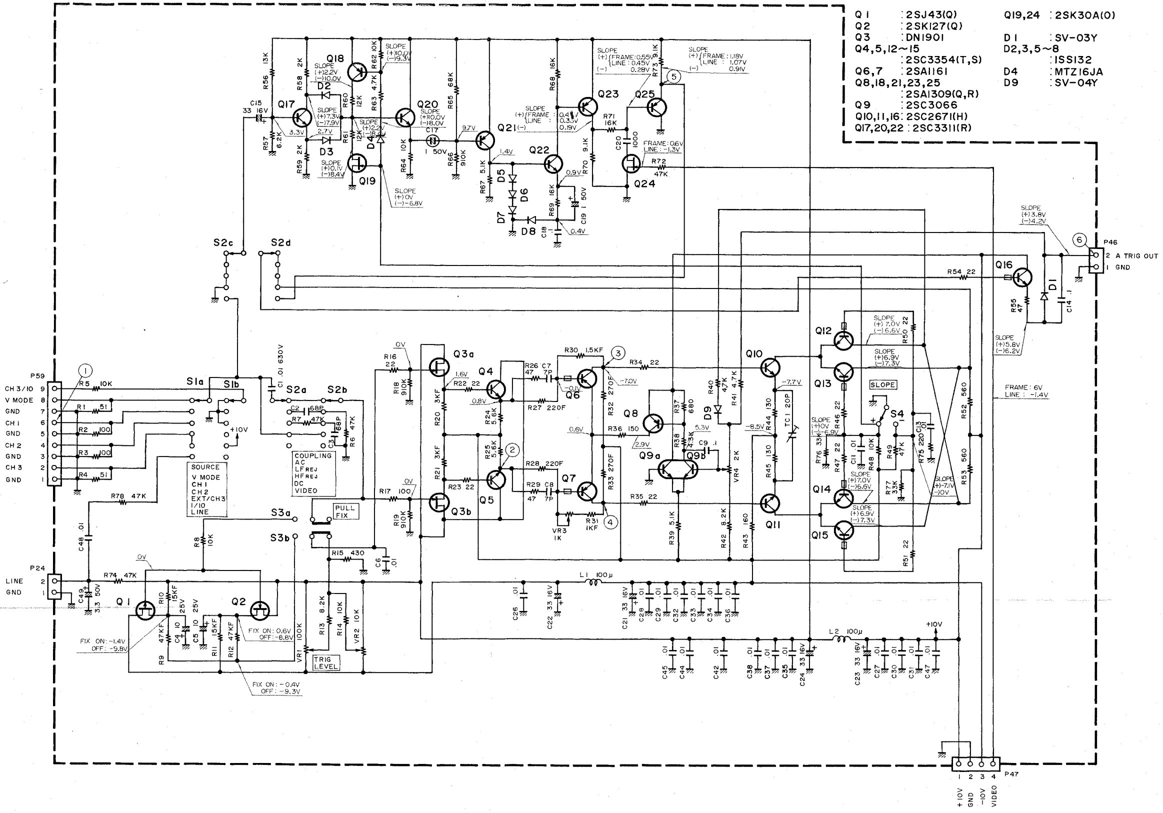
SCHEMATIC DIAGRA

A TRIG SWITCH UNIT (X77-1280-00)


P59
CH 3/10 9
V MODE 8
GND 7
CH 1 6
GND 5
CH 2 4
GND 3
CH 3 2
GND 1
①
R5 10K
R1 51
R2 100
R3 100
R4 51
R78 47K
C48 .01
P24
LINE 2
GND 1
C49 3.3 50V
R74 47K
0V
Q1
R10 15KF
R9 47KF
C4 10 25V
C5 10 25V
R11 15KF
R12 47KF
Q2
FIX ON: -1.4V OFF: -9.6V
FIX ON: 0.6V OFF: -8.8V
FIX ON: -0.4V OFF: -9.3V
VR1 100K
TRIG LEVEL
R13 8.2K
R14 10K
VR2 10K
R8 10K
S1a
S1b
+10V
SOURCE
V MODE
CH 1
CH 2
EXT/CH3
1/10
LINE
S2c
S2d
S2a
S2b
C1 .01 630V
C2 68P
R7 47K
C3 68P
R6 47K
COUPLING
AC
LF REJ
HF REJ
DC
VIDEO
S3a
S3b
PULL FIX
R15 430
C6 .01
R16 22
R18 910K
R17 100
R19 910K
0V
Q3a
Q3b
R20 3KF
R21 3KF
1.6V
R22 22
0.8V
R23 22
Q4
Q5
R24 5.6K
R25 5.6K
②
R26 47
C7 7P
R27 220F
R28 220F
R29 47
C8 7P
R30 1.5KF
③
④
Q6
Q7
-0.1V
-7.0
0.6V
R36 16
R32 270F
R33 270F
R31 1KF
VR3 1K
L1 100μ
C26 .01
C22 33 16V
C21 33 16V
C15 33 16V
R56 13K
R57 6.2K
Q17
3.3V
R58 2K
R59 2K
SLOPE (+)2.2V (−)10.0V
SLOPE (+)7.3V (−)7.9V
2.7V
D2
D3
SLOPE (+)10.1V (−)8.4V
Q18
R60 12K
R61 12K
R62 10K
R63 4.7K
Q19
SLOPE (+)10.0V (−)9.3V
SLOPE (+)2.2V (−)8.6V
D4
SLOPE (+)0V (−)-6.8V
Q20
SLOPE (+)10.0V (−)8.0V
R64 10K
C17 1 50V
R65 68K
R66 910K
9.7V
Q21
R67 5.1K
1.4V
D5
D6
D7
D8
C18 1
Q22
R68 16K
R69 16K
C19 1 50V
0.9V
0.4V
SLOPE (+) FRAME LINE (−)
0.4V 0.33V 0.19V
Q23
R70 9.1K
R71 16K
C20
SLOPE (+) FRAME LINE (−)

SCHEMATIC DIAGRAM

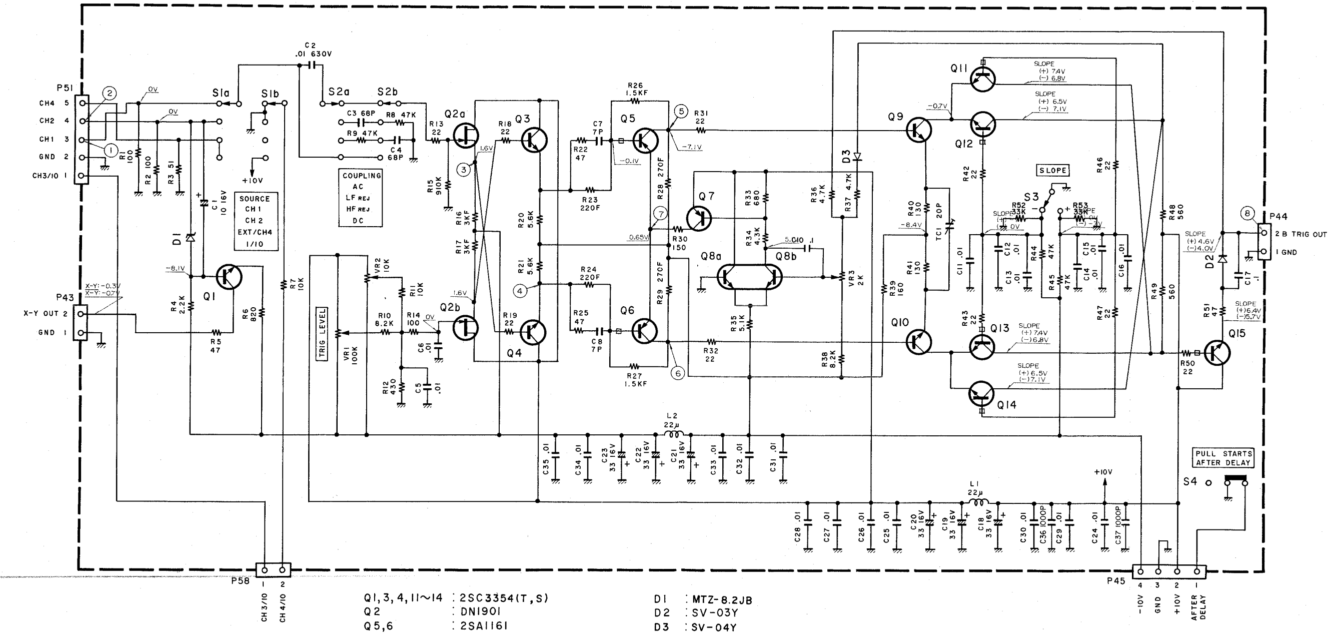
A TRIG SWITCH UNIT (X77-1280-00)


Q1 :2SJ43(Q)
Q2 :2SK127(Q)
Q3 :DN1901
Q4,5,12~15 :2SC3354(T,S)
Q6,7 :2SA1161
Q8,18,21,23,25 :2SA1309(Q,R)
Q9 :2SC3066
Q10,11,16 :2SC2671(H)
Q17,20,22 :2SC3311(R)
Q19,24 :2SK30A(O)
D1 :SV-03Y
D2,3,5~8 :1SS132
D4 :MTZ16JA
D9 :SV-04Y

P59
CH 3/10 9
V MODE 8
GND 7
CH 1 6
GND 5
CH 2 4
GND 3
CH 3 2
GND 1
P24
LINE 2
GND 1
P46
2 A TRIG OUT
1 GND
P47
1 2 3 4
+10V
GND
−10V
VIDEO
S1a
S1b
S2a
S2b
S2c
S2d
S3a
S3b
S4
SOURCE
V MODE
CH 1
CH 2
EXT/CH3
1/10
LINE
COUPLING
AC
LF REJ
HF REJ
DC
VIDEO
PULL
FIX
TRIG
LEVEL
SLOPE
FIX ON: −1.4V
OFF: −9.8V
FIX ON: 0.6V
OFF: −8.6V
FIX ON: −0.4V
OFF: −9.3V
FRAME: 6V
LINE: −1.4V
Q1
Q2
Q3a
Q3b
Q4
Q5
Q6
Q7
Q8
Q9a
Q9b
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
D1
D2
D3
D4
D5
D6
D7
D8
D9
L1 100µ
L2 100µ
TC1 20P
VR1 100K
VR2 10K
VR3 1K
VR4 2K
①
②
③
④
⑤
⑥

SCHEMATIC DIAGRAM

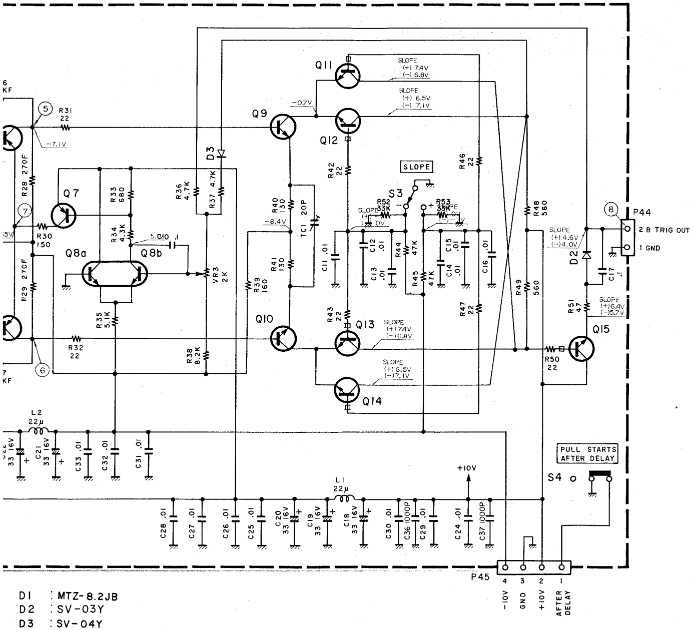
B TRIG SWITCH UNIT (X77-1290-00)


P51
CH4 5
CH2 4
CH1 3
GND 2
CH3/10 1
S1a
S1b
S2a
S2b
C2 .01 630V
C3 68P
R8 47K
R9 47K
C4 68P
COUPLING
AC
LF REJ
HF REJ
DC
SOURCE
CH1
CH2
EXT/CH4
1/10
+10V
R1 100
R2 100
R3 51
C1 10 16V
D1
-8.1V
Q1
R4 2.2K
R5 47
R6 820
R7 10K
P43
X-Y OUT 2
GND 1
X-Y: -0.3V
X-Y: -0.7V
0V
TRIG LEVEL
VR1 100K
VR2 10K
R11 10K
R10 8.2K
R14 100
R12 430
C5 .01
C6 .01
R13 22
R15 910K
Q2a
Q2b
1.6V
R16 3KF
R17 3KF
R18 22
R19 22
Q3
Q4
R20 5.6K
R21 5.6K
C7 7P
R22 47
R23 220F
R24 220F
R25 47
C8 7P
Q5
Q6
R26 1.5KF
R27 1.5KF
-0.1V
-7.1V
0.65V
R28 270F
R29 270F
R30 150
R31 22
R32 22
Q7
Q8a
Q8b
R33 680
R34 4.3K
R35 5.1K
5.0(10 .1
R36 4.7K
R37 4.7K
R38 8.2K
VR3 2K
D3
Q9
Q10
-8.4V
-0.7V
R39 160
R40 130
R41 130
TC1 20P
C11 .01
Q11
Q12
Q13
Q14
SLOPE (+) 7.4V (-) 6.8V
SLOPE (+) 6.5V (-) 7.1V
R42 22
R43 22
SLOPE
S3
R52 33K
R53 33K
0V
C12 .01
C13 .01
R44 47K
R45 47K
C14 .01
C15 .01
C16 .01
R46 22
R47 22
R48 560
R49 560
P44
2 B TRIG OUT
1 GND
SLOPE (+) 4.6V (-) 4.0V
D2
C17 .1
SLOPE (+) 6.4V (-) 5.7V
R51 47
R50 22
Q15
L2 22μ
C35 .01
C34 .01
C23 33 16V
C22 33 16V
C21 33 16V
C33 .01
C32 .01
C31 .01
PULL STARTS AFTER DELAY
S4
+10V
L1 22μ
C28 .01
C27 .01
C26 .01
C25 .01
C20 33 16V
C19 33 16V
C18 33 16V
C30 .01
C36 1000P
C29 .01
C24 .01
C37 1000P
P58
1 2
CH3/10
CH4/10
P45
4 3 2 1
-10V
GND
+10V
AFTER DELAY

Q1, 3, 4, 11~14 : 2SC3354(T, S)
Q2 : DN1901
Q5, 6 : 2SA1161
Q7 : 2SA1309(Q, R)
Q8 : 2SC3066
Q9, 10, 15 : 2SC2671(H)

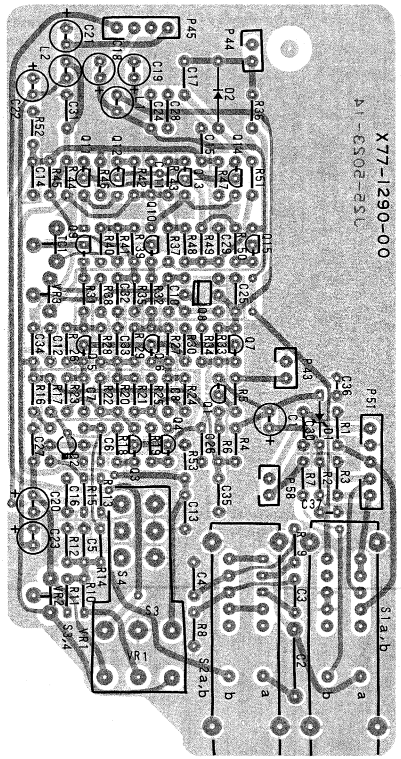
D1 : MTZ-8.2JB
D2 : SV-03Y
D3 : SV-04Y

ATIC DIAGRAM

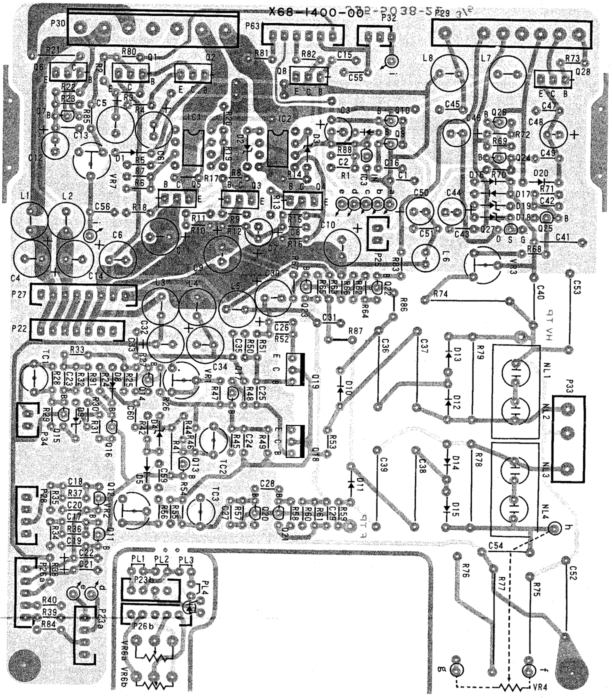

R31 22
R32 22
R28 270F
R29 270F
R30 150
Q7
Q8a
Q8b
R33 680
R34 4.3K
R35 5.1K
R36 4.7K
R37 4.7K
R38 8.2K
VR3 2K
D3
Q9
Q10
Q11
Q12
Q13
Q14
Q15
R39 160
R40 130
R41 130
TC1 20P
R42 22
R43 22
SLOPE
S3
R52 33K
R53 33K
R44 47K
R45 47K
R46 22
R47 22
R48 560
R49 560
R50 22
R51 47
D2
C17 .1
P44
2 B TRIG OUT
1 GND
-0.7V
-8.4V
-7.1V
SLOPE (+) 7.4V (−) 6.8V
SLOPE (+) 6.5V (−) 7.1V
SLOPE (+) 4.6V (−) 4.0V
SLOPE (+) 6.4V (−) 5.7V
L1 22μ
L2 22μ
+10V
PULL STARTS AFTER DELAY
S4
P45
4 -10V
3 GND
2 +10V
1 AFTER DELAY

D1 : MTZ-8.2JB
D2 : SV-03Y
D3 : SV-04Y

PC BOARD B TRIG SWITCH UNIT (X77-1290-00)

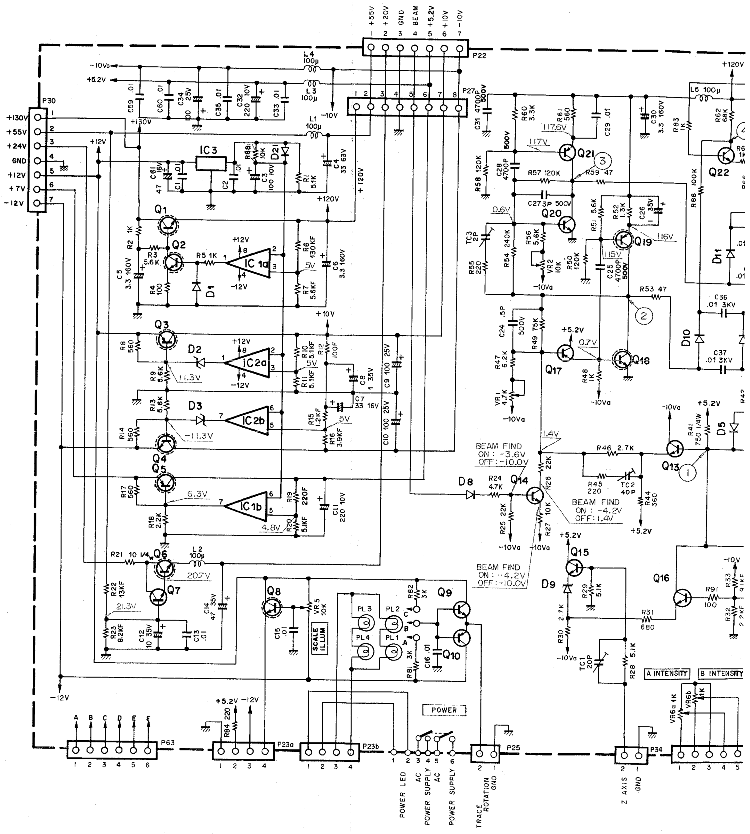

X77-1290-00
P45
P44
P43
P51
P58
S1a,b
S2a,b
S3
S4
VR1
VR2
VR3
a
b

PC BOARD POWER BLANKING UNIT (X68-1400-00)


X68-1400-00
P30
P63
P32
P29
P27
P22
P33
P34
P28
P26a
P23a
P23b
P26b
P25
PL1
PL2
PL3
PL4
IC1
IC2
IC3
L1
L2
L3
L4
L5
L6
L7
L8
NL1
NL2
NL3
NL4
VR1
VR2
VR3
VR4
VR5
VR6a
VR6b
VR7
TC1
TC2
TC3
HV 16

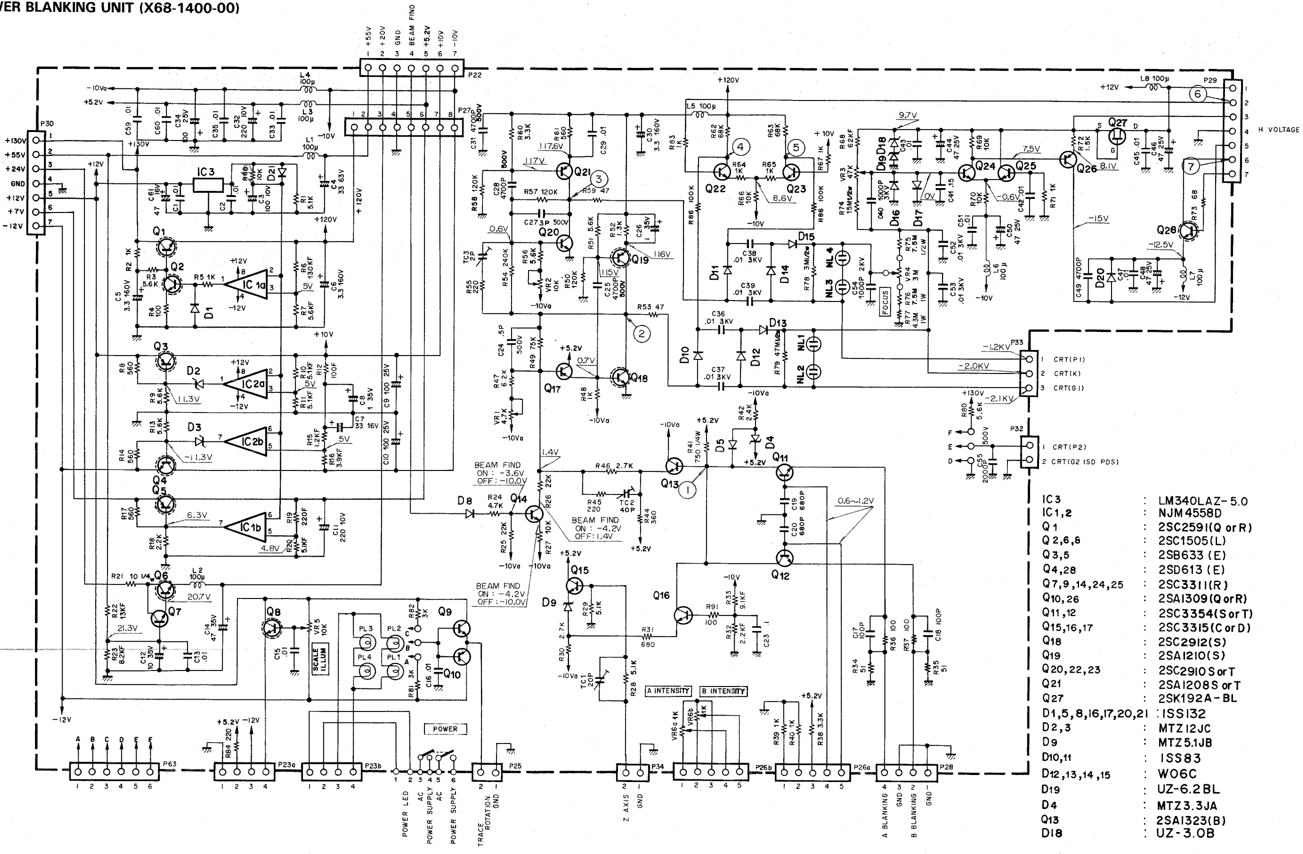
SCHEMATIC DIAGRA

POWER BLANKING UNIT (X68-1400-00)


−55V
+20V
GND
BEAM FIND
+5.2V
+10V
−10V
P22
P27a
P30
+130V
+55V
+24V
GND
+12V
+7V
−12V
−10Va
+5.2V
+120V
IC3
IC1a
IC2a
IC2b
IC1b
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
117.6V
117V
0.6V
115V
116V
11.3V
−11.3V
6.3V
4.8V
20.7V
21.3V
1.4V
0.7V
BEAM FIND
ON : −3.6V
OFF : −10.0V
BEAM FIND
ON : −4.2V
OFF : 1.4V
BEAM FIND
ON : −4.2V
OFF : −10.0V
SCALE ILLUM
POWER
A INTENSITY
B INTENSITY
P63
P23a
P23b
P25
P34
POWER LED
AC
POWER SUPPLY
AC
POWER SUPPLY
TRACE ROTATION
GND
Z AXIS
GND

SCHEMATIC DIAGRAM

POWER BLANKING UNIT (X68-1400-00)

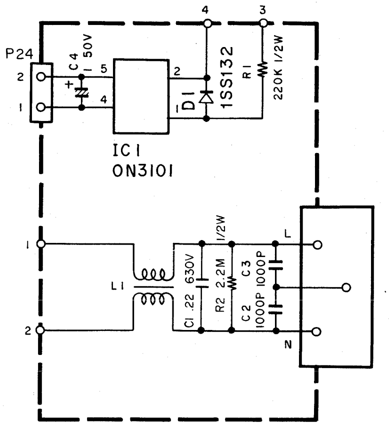

+55V
+20V
GND
BEAM FIND
+5.2V
+10V
-10V
P22
P27
P30
+130V
+55V
+24V
GND
+12V
+7V
-12V
IC3
IC 1a
IC2a
IC2b
IC1b
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
SCALE ILLUM
PL1
PL2
PL3
PL4
BEAM FIND ON : -3.6V OFF : -10.0V
BEAM FIND ON : -4.2V OFF : 1.4V
BEAM FIND ON : -4.2V OFF : -10.0V
FOCUS
NL1
NL2
NL3
NL4
P29
H VOLTAGE
P33
CRT(P1)
CRT(K)
CRT(G1)
P32
CRT(P2)
CRT(G2 ISD PDS)
A INTENSITY
B INTENSITY
POWER
P63
P23a
P23b
P25
P34
P26b
P26a
P28
POWER LED
AC POWER SUPPLY
AC POWER SUPPLY
TRACE ROTATION
GND
Z AXIS
GND
A BLANKING
GND
B BLANKING
GND

IC3 : LM340LAZ-5.0
IC1,2 : NJM4558D
Q1 : 2SC2591(Q or R)
Q2,6,8 : 2SC1505(L)
Q3,5 : 2SB633 (E)
Q4,28 : 2SD613 (E)
Q7,9,14,24,25 : 2SC3311(R)
Q10,26 : 2SA1309(Q or R)
Q11,12 : 2SC3354(S or T)
Q15,16,17 : 2SC3315(C or D)
Q18 : 2SC2912(S)
Q19 : 2SA1210(S)
Q20,22,23 : 2SC2910 S or T
Q21 : 2SA1208 S or T
Q27 : 2SK192A-BL
D1,5,8,16,17,20,21 : 1SS132
D2,3 : MTZ12JC
D9 : MTZ5.1JB
D10,11 : 1SS83
D12,13,14,15 : W06C
D19 : UZ-6.2BL
D4 : MTZ3.3JA
Q13 : 2SA1323(B)
D18 : UZ-3.0B

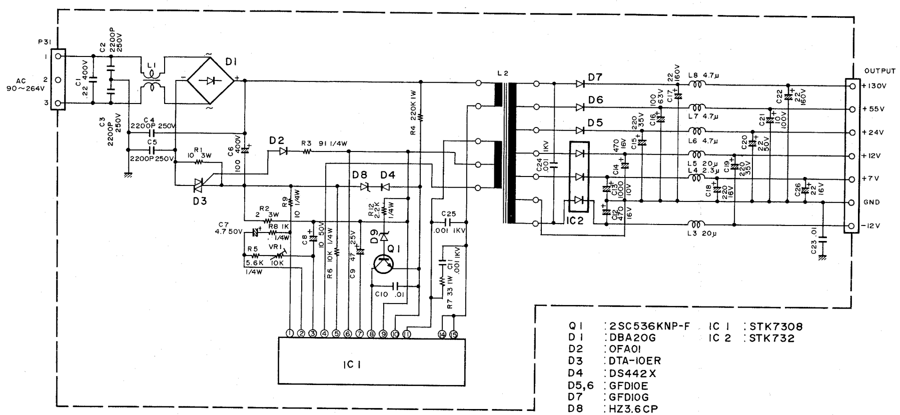
SCHEMATIC DIAGRAM

PC BOAR

FILTER UNIT (X70-1020-00)


P24
2
1
C4
1 50V
5
4
2
D1
1SS132
R1
220K 1/2W
4
3
IC1
ON3101
L1
1
2
1/2W
C1 .22 630V
R2 2.2M
C3 1000P
C2 1000P
L
N

SWITCHING POWER SUPPLY UNIT (W02-0413-05)


P31
AC
90～264V
C1 .22 400V
C2 2200P 250V
C3 2200P 250V
C4 2200P 250V
C5 2200P 250V
L1
D1
R1 10 3W
C6 100 400V
D2
R3 91 1/4W
D3
R4 220K 1W
D8
D4
R9 10 1/4W
R2 2 3W
R8 1K 1/4W
C7 4.7 50V
R5 5.6K 1/4W
VR1 10K
C8 10 50V
R6 10K 1/4W
C9 47 25V
R12 2.2K 1/4W
D9
Q1
C10 .01
C25 .001 1KV
C11 .001 1KV
R7 33 1W
IC1
L2
C24 .001 1KV
D7
D6
D5
IC2
C17 22 160V
C16 100 63V
C15 220 35V
C14 470 16V
C13 1000 10V
C12 470 16V
L8 4.7μ
L7 4.7μ
L6 4.7μ
L5 20μ
L4 2.3μ
L3 20μ
C22 22 160V
C21 10 100V
C20 22 50V
C19 220 35V
C18 220 16V
C26 22 16V
C23 .01
OUTPUT
+130V
+55V
+24V
+12V
+7V
GND
-12V

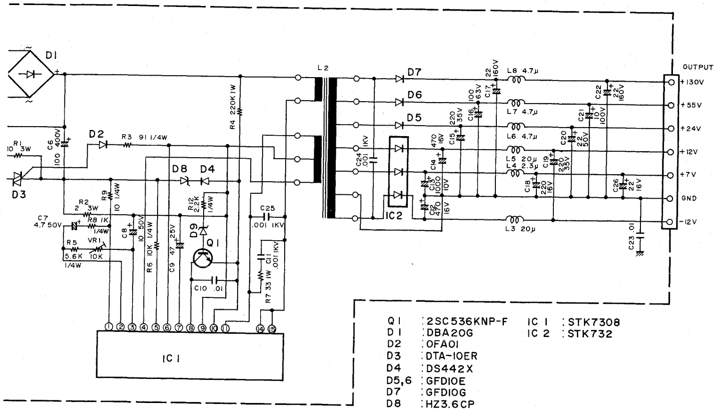
Q1 :2SC536KNP-F
D1 :DBA20G
D2 :OFA01
D3 :DTA-10ER
D4 :DS442X
D5,6 :GFD10E
D7 :GFD10G
D8 :HZ3.6CP
D9 :GZA6.2Z

IC1 :STK7308
IC2 :STK732

PC BOAR

MATIC DIAGRAM

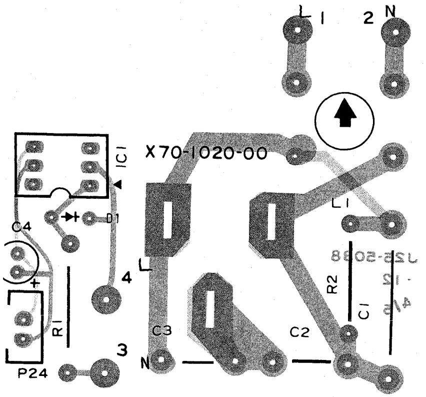
VER SUPPLY UNIT (W02-0413-05)


D1
D2
D3
D4
D5
D6
D7
D8
D9
R1 10 3W
R2 2 3W
R3 91 1/4W
R4 220K 1W
R5 5.6K 1/4W
R6 10K 1/4W
R7 33 1W
R8 1K 1/4W
R9 10 1/4W
R12 2.2K 1/4W
VR1 10K
C6 100 400V
C7 4.7 50V
C8 10 50V
C9 47 25V
C10 .01
C11 .001 1KV
C14 470 16V
C15 220 35V
C16 100 63V
C17 22 160V
C18 220 16V
C19 220 35V
C20 22 50V
C21 10 100V
C22 22 160V
C23 .01
C24 .001 1KV
C25 .001 1KV
C26 22 16V
L2
L3 20μ
L4 2.3μ
L5 20μ
L6 4.7μ
L7 4.7μ
L8 4.7μ
Q1
IC1
IC2
OUTPUT
+130V
+55V
+24V
+12V
+7V
GND
-12V

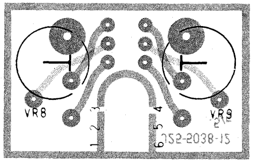
Q1 : 2SC536KNP-F
D1 : DBA20G
D2 : OFA01
D3 : DTA-10ER
D4 : DS442X
D5,6 : GFD10E
D7 : GFD10G
D8 : HZ3.6CP
D9 : GZA6.2Z

IC1 : STK7308
IC2 : STK732

PC BOARD FILTER UNIT (X70-1020-00)


L1
2
N
X70-1020-00
IC1
D1
C4
P24
R1
4
3
N
C3
C2
C1
R2
L1

PC BOARD ASTIG UNIT (X81-1430-00)


VR8
VR9
1
2
3
4
5
6